

ATMOSPHERIC TRACER STUDIES TO CHARACTERIZE THE TRANSPORT  
AND DISPERSION OF POLLUTANTS IN THE CALIFORNIA DELTA REGION

VOLUME II, PART A:  
PRESENTATION OF TRACER AND METEOROLOGICAL DATA

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SUMMARY  
VOLUME II, PARTS A AND B

It appears that the Montezuma Hills in the California Delta region may become the construction site for a series of large industrial facilities. The Delta region lies in a major channel for interbasin air flow between the San Francisco Bay Area and the Sacramento and San Joaquin Valleys of central California. For this reason, eight atmospheric tracer tests, utilizing SF<sub>6</sub> and CBrF<sub>3</sub> as dual tracers, were conducted during early September in order to probe the transport and dispersion of pollutants to and from the Montezuma Hills. An extensive air sampling system and meteorological observation system were employed in cooperation with Meteorology Research, Inc. (MRI) to measure as completely as possible all of the important variables associated with the tracer transport and dispersion. The tracer and pertinent meteorological data are presented in this report. A complete discussion of the meteorological and air quality data has been prepared by personnel from MRI; the MRI report is available under separate cover.

A brief summary of the results and conclusions are given in the Executive Summary, while a complete description of the study, the results, and conclusions are presented in Volume I. The tracer and meteorological data are presented graphically in Volume II, Part A; the same data are tabulated in Volume II, Part B. The tracer and meteorological data are also available as a computer card data deck.

Volume II, Parts A and B serve as the presentation and tabulation of the data base. For the sake of completeness and clearness, the data are graphically presented in several forms. Overview maps of automobile and airborne traverse tracer data and overview maps of the hourly averaged

tracer data provide a visual summary of the transport and dispersion of the tracers. The data are also presented individually by traverse and hourly sampling station.

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## 1. Introduction

This data volume presents the results of a series of atmospheric tracer tests conducted in the California Delta Region of Central California during September, 1976. Plans for large-scale industrialization of this area require an analysis of the impact upon air quality that would result from such industrial development. A necessary part of the impact analysis and the purpose of this work is the characterization of the transport and dispersion of gaseous pollutants through the Delta Region under typical and worst-case meteorological conditions.

Eight tracer releases were conducted from August 31, 1976, through September 14, 1976; during seven of the tests, either SF<sub>6</sub> or CBrF<sub>3</sub> was released from property owned by Dow Chemical in the Montezuma Hills. On the two days where CBrF<sub>3</sub> was used, SF<sub>6</sub> was released upwind of the Dow site from Martinez during Test 2 and from Pinole during Test 7. During the eighth test, SF<sub>6</sub> was released from Pinole. The test schedule and release rates are given in Table 1. A map of the region showing the release points is given in Figure 1.

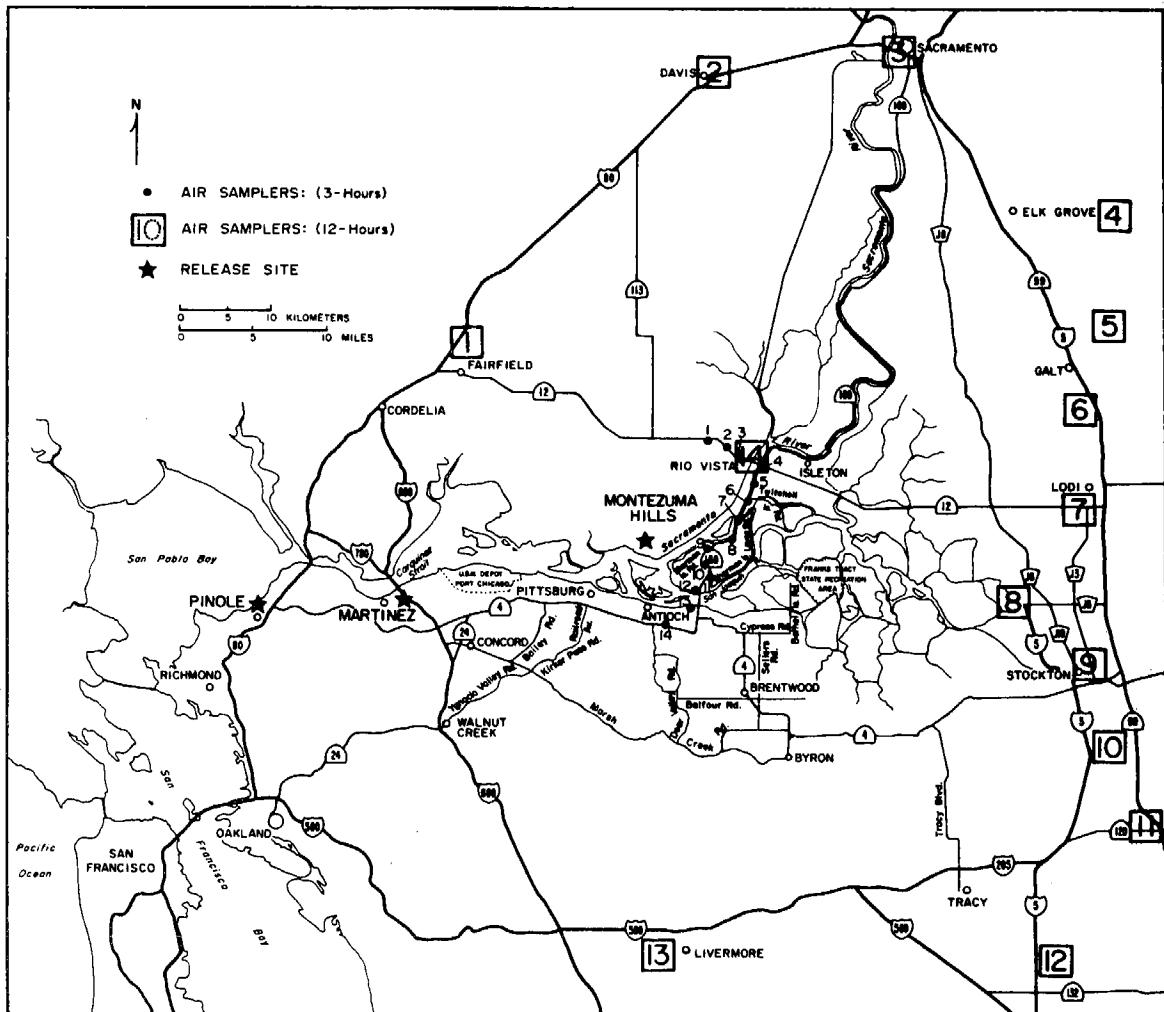


Figure 1. The California Delta Region

TABLE 1

## TRACER RELEASE DATA

Date	Test	Location* of SF <sub>6</sub> Release	Release Period (PDT)	Release Rate (grams/sec)	Location of CBrF <sub>3</sub> Release	Release Period	Release Rate
8/31/76	1	Montezuma Hills	1200-1700	10.6 1.01 tons/day	-	-	-
9/2/76	2	Martinez	1100-1600	11.4 1.08 tons/day	Montezuma Hills	1300-1500	16.6 1.58 tons/day
9/5/76	3	Montezuma Hills	0000-0500	9.5 0.90 tons/day	-	-	-
9/6/76	4	Montezuma Hills	1800-2300	10.8 1.03 tons/day	-	-	-
9/9/76	5	Montezuma Hills	1130-1330	10.7 1.02 tons/day	-	-	-
9/10/76	6	Montezuma Hills	0600-1100	10.5 1.00 tons/day	-	-	-
9/13/76	7	Pinole	0600-1500	11.5 1.09 tons/day	Montezuma Hills	0900-1100	16.0
						1300-1400	16.0 1.52 tons/day
9/14/76	8	Pinole	0730-1300	10.9 1.04 tons/day	-	-	-

\* Exact Tracer Release Locations: (1) Montezuma Hills: tracer was released from a truck parked by the Dow Chemical air quality monitoring station. The monitoring station is located approximately 4.3 Km east of Collinsville and 2 Km north of the Sacramento River. (2) Martinez: tracer was released from the parking lot of the Mountain View Sanitary District Sewage Plant at the end of Arthur Road. (3) Pinole: tracer was released from the parking lot of the Pinole police station on Pear Street.

## 2. Experimental Procedure

Tracers were released at approximately 5 meters above the ground from a truck parked at the release location. The release rate was monitored continuously using a large-volume rotameter. The average release rate was determined from measurements of the weight of the gas cylinders before and after each release.

Grab samples (10-second average) were taken in 30 cm<sup>3</sup> plastic syringes along automobile and airborne crosswind traverses at various downwind distances during the tracer releases. Air samples were also taken during vertical airborne spirals downwind of the release point. Hourly averaged air samples were taken at 14 locations in the region using 28 sequential, 12-hour air samplers. During most of the tests, samples were collected over 24 hours during the test period. Additional hourly averaged data were obtained at 14 locations immediately downwind of the Dow site during the first two tests using sequential, 3-hour air samplers. During the eight tests, 4508 automobile traverse samples, 1258 airborne traverse samples, 330 airborne spiral samples, 1721 hourly averaged 12-hour board samples, and 153 hourly averaged 3-hour board samples were collected; the total number of samples collected was 7970. The description of the automobile and airborne data is given in Table 3. The locations of traverse routes and the hourly sampling points are shown in Figure 1; Table 2 gives the location of each hourly sampling point.

Meteorological data, consisting of surface and upper air wind speed and direction data, mixing height estimations, cloud cover reports, and standard deviations of the horizontal wind, were collected from a variety of agencies or were obtained from Meteorology Research, Inc. (MRI).

TABLE 2

## LOCATION OF 12-HOUR SEQUENTIAL AIR SAMPLERS

Station No.	Name	Distance South of Sacramento (km)
1	Fairfield, roof of California Holiday Lodge, 2100 N. Texas Street	--
2	University of California at Davis, Roof of Physics Building	--
3	Sacramento, 1025 P Street, Roof of State Police Offices	0
4	Elk Grove, 1 mile south of Wilton along Consummes Road, on the ground at power substation	18.0
5	Herald, 13020 West Lane	29.9
6	Collier Road, on the roof of the A & D Market, 0.5 miles west of Highway 99	39.3
7	Lodi, roof of maintenance building, corner of Ham and Kettleman Lane (Highway 12), 4.0 miles west of Highway 99	49.9
8	Hammer Lane, roof of Hammer Lane Fire Station, ~1 mile west of J8 and Hammer Lane junction	62.7
9	Stockton, roof of San Joaquin Health Center, 1601 East Hazelton Avenue	67.0
10	French Camp, roof of fire station, 1 mile south- east of I5, J9 junction along J9	76.0
11	Manteca, roof of old Manteca fire station, 1 mile east of 120, J3 junction	84.8
12	Tracy, roof of fire station, corner of Koster and Durham Ferry Road, 6 miles southeast of Tracy	99.3
13	Livermore, roof of Bay Area APCD Livermore Station, 2131 Railroad Avenue	--
14	Rio Vista, roof of Rio Vista fire station, 400 Main Street	--

TABLE 2 (cont.)  
LOCATION OF 3-HOUR BOARDS

Station No.	Name	Distance N. of 4 & 160 Junction (km)
1	Cattey's Farm	26.4
2	Mark's Farm	23.8
3	Nursery (Cemetery)	22.2
4	McKinnon's Orchard	20.0
5	Alternate	17.9
6	Brannon Island State Recreation Area	15.9
7	Anderson	13.4
8	Domballion	10.9
9	Power Line #1	8.8
10	Power Line #2	7.4
11	State Fish and Game	6.1
12	State Highway Department	4.2
13	Wagner	1.6
14	Ventrini	3.4 (south of 4 & 160)

TABLE 3  
AUTOMOBILE TRAVERSES

Date	Test No.	Traverse No.	Highway	Direction Travelled	Crossroad	Traverse Time (PDT)	Distance Traveled (km)	No. Samples
8/31/76	1	1	99,120,1205	South, west	Highway 12	1400-1450	58.7	74
	2	160		South	Twitchell Island Road	1420-1433	16.7	53
	3	160		North	Highway 4	1430-1445	14.8	47
	4	160		South	Twitchell Island Road	1515-1527	14.8	47
	5	15,120,99		East, north	Interstate 205	1600-1652	68.3	86
	6	160		North	Highway 4	1630-1641	14.8	47
	7	99,120,1205		South, west	Boessow Road (Galt)	1701-1753	70.8	89
							88	
9/2/76	2	1	1680	South	Interstate 780	1130-1143	20.0	63
	2	1680		North	Highway 24 (Walnut Creek)	1215-1228	20.0	63
	3	4,160		East, north	Loveridge Road	1240-1350	25.7	17
	4	160		North	Highway 4	1400-1415	18.7	59
	5	160		South	Highway 12	1445-1503	18.7	59
	6	160		North	Highway 4	1515-1530	18.3	39
	7	Railroad Ave.		Southwest	Highway 4	1545-1635	29.8	69
	8	Empire Mine Road		South	Lone Tree Road	1625-1640	10.4	14

TABLE 3 (cont.)

## AUTOMOBILE TRAVERSES

Date	Test No.	Traverse No.	Highway	Direction Traveled	Crossroad	Traverse Time (PDT)	Distance Traveled (km)	No. Samples
9/2/76 (cont.)	2	9	99,120,1205	South	Collier Road	1630-1715	63.6	80
	10	1580,1205,120, 99	East, north	Foothill Road (Dublin)		1630-1737	90.9	114
	11	1205,120,99	East, north	MacArthur Dr.		1731-1815	63.6	80
9/5/76	3	1	160	North	Highway 4	0100-0112	18.7	59
	2	99,120	South, west	Highway 12		0130-0210	63.6	80
	3	99	South, west	Boessow Road		0213-0259	63.6	80
	4	160	South	(Emmaton)		0240-0300	6.6	42
	5	4	West	Interstate 5		0247-0320	47.5	60
	6	160	South	Highway 12		0259-0306	5.1	65
	7	4	West	Interstate 5		0332-0415	63.6	80
	8	4,J3,12	East, north, west	Byron Road		0414-0545	74.8	93
	9	160	North	Highway 4		0430-0445	8.9	56
	10	12,J8	East, south	Highway 160		0432-0517	38.1	80
	11	160	South	Bean pot		0441-0450	6.1	77
	12	160	North	San Joaquin River		0502-0511	7.6	48
	13	12	East	Terminus		0630-0637	8.7	18
	14	J8	North	Highway 12		0637-0647	14.5	19

TABLE 3 (cont.)

## AUTOMOBILE TRAVERSSES

Date	Test No.	Traverse No.	Highway	Direction Traveled	Crossroad	Traverse Time (PDT)	Distance Traveled (km)	No. Samples
9/6/76	4	1	160	South	Highway 12	1928-1946	18.7	59
	2	99,120,1205	South, west	Highway 12	2130-2217	63.6	80	
3	160		South	Bean pot	2132-2140	6.4	80	
4	99,120,1205		South, west	Kettelman Lane	2200-2246	63.6	80	
5	160		North	San Joaquin River Bridge	2214-2222	6.3	79	
6	1205,120,99		East, north	Tracy Blvd.	2232-2320	63.6	80	
7	1205,120,99		East, north	Patterson Pass Rd. (1.4 mi e of)	2315-2400	63.6	80	
9/9/76	5	1	4	East	Railroad Ave.	1255-1315	15.0	94
	2	4, 160	East, north	Railroad Ave.	1314-1330	25.4	80	
3	Sellers Rd., Cypress Rd., Bethel Island Rd.		North, east, north	Highway 4	1349-1417	14.9	38	
4	Balfour Rd.		East	Deer Valley Rd.	1351-1405	12.1	26	
5	Marsh Creek Rd.		East	Deer Valley Rd.	1356-1428	35.7	75	
6	160,4		South, west	Twitchell Island Road	1359-1416	25.4	80	
7	Balfour Road		West	Byron Highway	1413-1426	12.1	26	
8	Balfour Road		East	Deer Valley Rd.	1436-1450	12.1	26	

TABLE 3 (cont.)

## AUTOMOBILE TRAVERSES

Date	Test No.	Traverse No.	Highway Traveled	Direction Traveled	Crossroad	Traverse Time (PDT)	Distance Traveled (km)	No. Samples
9/10/76	6	1	Sherman Island Road	Southwest	160	0800-0815	5.8	37
	2	160		South	12	0740-0753	15.9	100
	3	99,120,1205	South, west	Highway 12		1001-1051	63.6	80
	4	Sherman Levee Road	South	Highway 160		1023-1033	9.5	60
	5	99	South, west	Highway 12		1030-1115	63.6	80
	6	160	North	San Joaquin River Bridge		1022-1033	6.4	80
	7	160	North	San Joaquin River Bridge		1103-1112	6.4	80
	8	1205,120,99	East, north	Patterson Pass Rd. (1.5 mi e of)	1105-1203	63.6	80	11
	9	1205,120,99	East, north	Tracy Blvd.		1145-1230	63.6	80
9/13/76	7	1	24,1680,1780	East, north	Highway 13	0924-0956	48.3	100
	2	Sherman Island Road	Northeast	S. end of Sherman Island Rd.	0940-1155	7.0	88	
	3	12,160,4	East, south, west	Interstate 80	1113-1217	75.6	48	
	4	1780,1680	South	Interstate 80	1130-1146	24.9	32	
	5	1580,1205,120	East	Vasco Road	1335-1458	138.4	87	
	6	1780,1680,24	South, west	Interstate 80	1340-1414	51.5	33	

TABLE 3 (cont.)  
AUTOMOBILE TRAVERSES

Date	Test No.	Traverse No.	Highway Traveled	Direction Traveled	Crossroad	Traverse Time (PDT)	Distance Traveled (km)	No. Samples
9/13/76 (cont.)	7	7	I580	East	Highway 238	1429-1451	33.8	22
	8	180,17,238, I580	S,S,E,E Vasco, Walnut 4,160,12	W. Texas N,N,W		1450-1706	191.5	120
	9	1580	West	Highway 84		1458-1532	33.8	22
	10	24,1680,I780	East, north	Interstate 580		1537-1611	53.1	34
	11	99,120,1205, I580	S, west	Mack Road		1654-1820	132.0	83
	12	1580,17	West, north	Highway 84		1835-1901	25.7	17
9/14/76	8	1	1680	South	Interstate 80	0906-0931	38.6	49
	2	1680	North	Highway 24		0941-1007	38.6	49
	3	12,160,4,24	E,S,W,S	W. Texas Ave. (Fairfield)		1047-1151	91.7	58
	4	1680	North	Highway 24 (Walnut Creek)		1154-1220	38.6	49

TABLE 3 (cont.)

## AIRBORNE TRAVERSSES AND SPIRALS

Date	Test No.	Traverse No.	Traverse Path and Direction	Altitude (meters, MSL)	Traverse Time	Distance Traveled (km)	No. Samples
9/10/76	6	1	VACA-Dixon Airport south to Isleton	305	0934-0946	38.1	11
	2		Isleton s. to 4 mi. e. of Brentwood	305	0950-1005	24.3	59
	3		4 mi. e. of Brentwood s. to 1580-1205 junction	305	1012-1020	23.1	9
	4		1580-1205 junction n. to 4 mi. e. of Brentwood	183	1044-1052	23.1	8
	5		4 mi. e. of Brentwood n. to Isleton	183	1054-1107	24.3	52
	6		Isleton n. to VACA-Dixon Airport	183	1109-1122	38.1	14
	7		Isleton s. to 4 mi. e. of Brentwood	427	1140-1153	24.3	25
	8		Junction S.P.T. Co. Railroad & 1580 n. to 15 and 1205	305	1229-1235	17.8	7
	9		15-1205 n. to Wilson Way & Highway 99	305	1238-1251	27.5	27
	10		Sacramento Executive Airport s. to Ripon	183	1000-1039	94.1	40
	11		Ripon n. to Sacramento Executive Airport	183	1100-1139	94.1	40
	12		Sacramento Executive Airport s. to Ripon	183	1200-1239	94.1	40

TABLE 3 (cont.)

## AIRBORNE TRAVERSES AND SPIRALS

Date (cont.)	Test No. (cont.)	Traverse No.	Traverse Path and Direction	Altitude (meters, MSL)	Traverse Time	Distance Travelled (km)	No. Samples
9/10/76	6	13	Ripon n. to Sacramento Executive Airport	183	1300-1339	94.1	40
9/13/76	7	1	Cordelia s. to 1680 and Highway 24 (Walnut Creek)	427	0736-0748	36.5	50
		2	1680 and Highway 24 n. to Cordelia	305	0757-0810	36.5	53
		3	Cordelia s. to 1680 and Highway 24	183	0819-0832	36.5	53
		4	Cordelia s. to 1680 and Highway 24	427	0906-0918	36.5	12
		5	1680 & 24 to Cordelia	305	0925-0938	36.5	53
		6	Cordelia to 1680 & 24	183	0945-0958	36.5	53
		7	VACA-Dixon Airport s. to Isleton	183	1112-1324	38.1	26
		8	Isleton s. to 1580 & 1205	183	1327-1343	47.0	62
		9	1205 & 1580 n. to Isleton	305	1348-1404	47.0	68
		10	Isleton n. to VACA-Dixon Airport	305	1409-1422	38.1	27
		11	VACA-Dixon Airport s. to Isleton s. to 1580 & 1205	427	1428-1456	85.1	55
		12	Livermore Airport East to 15-205	457	1759-1812	44.1	27
		13	I5 & I205 Northeast to Stockton Airport	457	1815-1822	16.2	13

TABLE 3 (cont.)

AIRBORNE TRAVERSES AND SPIRALS

Date	Test No.	Traverse No.	Traverse Path and Direction	Altitude (meters, MSL)	Traverse Time	Distance Traveled (km)	No. Samples
10/10/2023	1	1	North	1000	1 hour	10	10

TABLE 3 (cont.)

## AIRBORNE TRAVERSES AND SPIRALS

Date	Test No.	Traverse No.	Traverse Path and Direction	Altitude (meters, MSL)	Traverse Time	Distance Traveled (km)	No. Samples	$\Delta H$ (meters)
9/13/76 (cont.)	7	3	0.5 mi n. of the Port Chicago Naval Magazine	914 to 488	1008-1013	-	8	61
	4	4	0.5 mi n. of the Port Chicago Naval Magazine	457 to 0	1013-1017	-	31	15
	5	5	Rio Vista	1829 to 914	1518-1526	-	16	61
	6	6	Rio Vista	884 to 30	1526-1534	-	29	31
	7	7	Tracy	1829 to 914	1553-1559	-	16	61
	8	8	Tracy	884 to 91	1559-1603	-	27	31
	9	9	Stockton	1524 to 762	1832-1838	-	14	61
	10	10	Stockton	732 to 30	1838-1844	-	24	31
9/14/76	8	1	0.5 mi n. of Port Chicago Naval Magazine	1067 to 457	0921-0926	-	11	61
	2	2	0.5 mi n. of Port Chicago Naval Magazine	442 to 15	0926-0930	-	29	15
	3	3	0.5 mi n. of Port Chicago Naval Magazine	1372 to 457	1039-1044	-	16	61
	4	4	0.5 mi n. of Port Chicago Naval Magazine	442 to 15	1044-1049	-	29	15

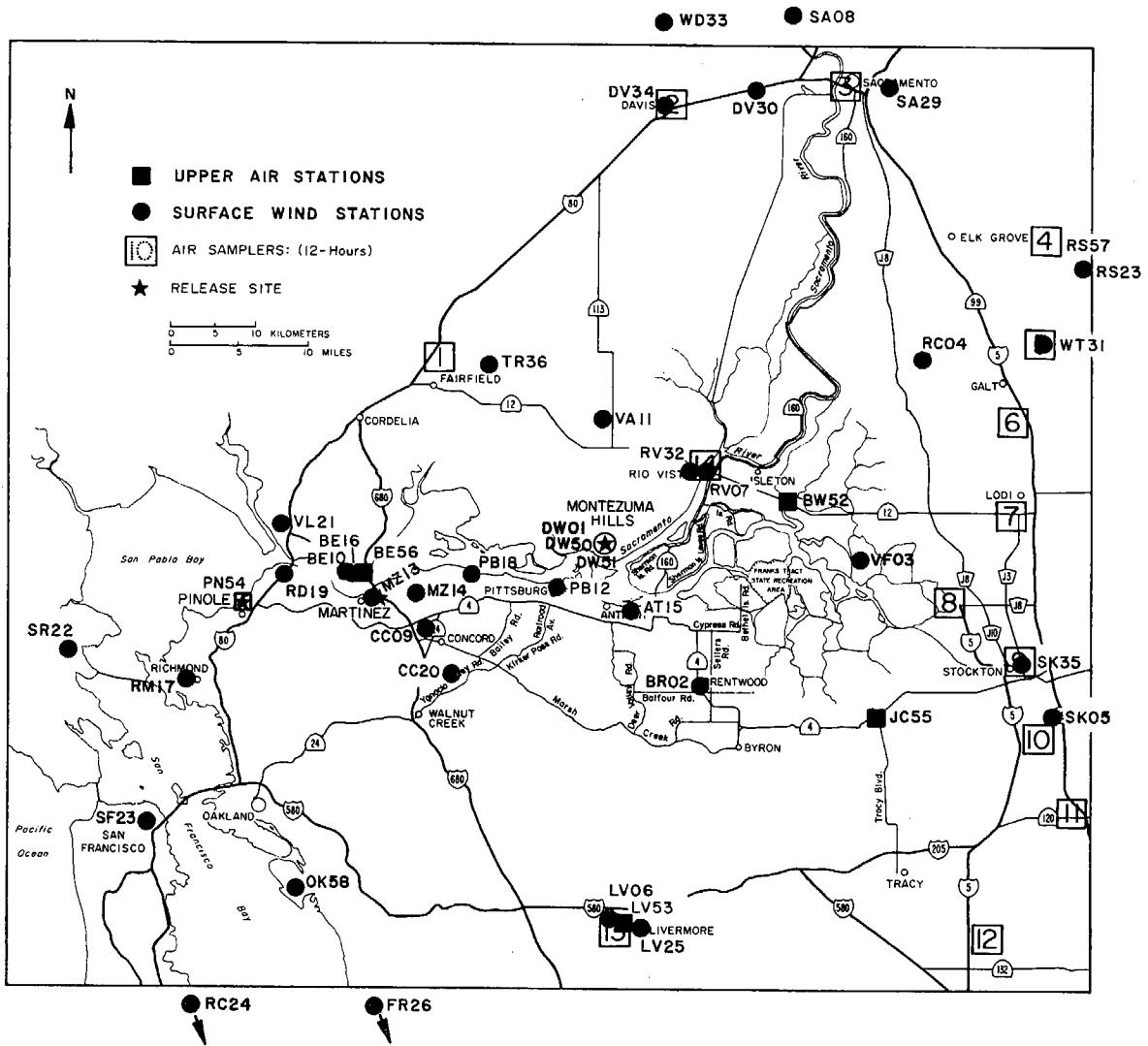


Figure 2. Location of surface wind and upper air data stations.

TABLE 4  
WIND DATA STATIONS AND DESCRIPTION OF DATA

Station	Station Code	Description of Data
1 Dow Surface (Rockwell)	DW01	Hourly averaged wind speed, wind direction at 5-minute intervals
2 Brentwood (Rockwell)	BR02	Hourly averaged wind speed, wind direction at 5-minute intervals
3 Venice Ferry (MRI)	VF03	Hourly averaged speed and direction
4 Rio Cosumnes (MRI)	RC04	Hourly averaged speed and direction
5 Stockton (NWS)	SK05	Single hourly observations
6 Livermore (NWS)	LV06	Single hourly observations
7 Rio Vista (NWS)	RV07	Single hourly observations
8 Sacramento (Metropolitan Airport) (NWS)	SA08	Single hourly observations
9 Concord (Buchanan Field) (NWS)	CC09	Single hourly observations
10 Benicia (BAAPCD)	BE10	Hourly averaged speed and direction
11 Voice of America Radio Tower	VA11	Hourly averaged speed and direction
12 Pittsburg PG&E Company	PB12	Hourly averaged speed and direction
13 Martinez Shell Oil	MZ13	Hourly averaged speed and direction
14 Martinez Lion Oil	MZ14	Hourly averaged speed and direction
15 Antioch Fibreboard	AT15	Hourly averaged speed and direction

TABLE 4 (cont.)

Station	Station Code	Description of Data
16 Benicia Exxon	BE16	Hourly averaged speed and direction
17 Richmond Allied Chemical	RM17	Hourly averaged speed and direction
18 Pittsburg Allied Chemical	PB18	Hourly averaged speed and direction
19 Rodeo Union Oil	RD19	Hourly averaged speed and direction
20 Concord BAAPCD	CC20	Hourly averaged speed and direction
21 Vallejo BAAPCD	VL21	Hourly averaged speed and direction
22 San Rafael BAAPCD	SR22	Hourly averaged speed and direction
23 San Francisco BAAPCD	SF23	Hourly averaged speed and direction
24 Redwood City BAAPCD	RC24	Hourly averaged speed and direction
25 Livermore BAAPCD	LV25	Hourly averaged speed and direction
26 Fremont BAAPCD	FR26	Hourly averaged speed and direction
27 Pittsburg BAAPCD	PB27	Hourly averaged speed and direction
28 Rancho Seco Nuclear Power Plant Site	RS28	Hourly averaged speed and direction
29 Sacramento Caltrans	SA29	Hourly averaged speed and direction
30 Davis Caltrans	DV30	Hourly averaged speed and direction

TABLE 4 (cont.)

Station	Station Code	Description of Data
31 Wilton Caltrans	WT31	Hourly averaged speed and direction
32 Rio Vista Yolo-Solano APCD	RV32	3-Hourly averaged speed and direction
33 Woodland Yolo-Solano APCD	WD33	2-Hourly averaged speed and direction
34 Davis Yolo-Solano APCD	DV34	2-Hourly averaged speed and direction
35 Stockton San Joaquin APCD	SK35	Miles of wind/hr by quadrant
36 Travis Travis Air Force Base	TR36	Single hourly observations

20  
TABLE 4 (cont.)

UPPER AIR WIND SPEED AND DIRECTION MEASUREMENTS

Station	Station Code	Date and Time (PDT)	
Dow Tower	DW50	Continuous 8/31/76 through 9/14/76	
Dow Pibal	DW51	8/31/76	1100-1700
		9/2/76	1000-1700
		9/5/76	0000-0500
		9/6/76	1700-2300
		9/9/76	1100-1400
		9/10/76	0700-1200
		9/13/76	0700-1700
		9/14/76	0800-1600
B & W Resort Pibal	BW52	8/31/76	1000-1800
		9/2/76	1000-1800
		9/5/76	0000-0600
		9/6/76	1600-2400
		9/9/76	1000-1400
		9/10/76	0800-1900
Livermore Pibal	LV53	8/31/76	1000-1800
		9/2/76	0900-1000
		9/9/76	0900-1900
		9/10/76	1100-1800
		9/13/76	0800-1800
		9/14/76	0800-1500
Pinole Pibal	PN54	9/13/76	0600-1600
		9/14/76	0600-1700
Junction J2 & CAL4 Pibal	JC55	9/14/76	1600-1900
Benicia Pibal	BE56	9/10/76	1400
Rancho Seco Nuclear Power Plant Site Tower	RS57	Continuous at 200 feet, hourly standard deviation of the wind	
Oakland International Airport Pibal	OK58	8/31/76 through 9/14/76 2 measurements per day	

### 3. Presentation of the Tracer Data

This data volume (Volume II) serves as a reference to Volume I of this report where the analysis of the tracer and meteorological data along with detailed accounts of the experimental procedures are given. The tracer data are given as parts per trillion (ppt) or part tracer/ $10^{-12}$  parts air by volume; unless otherwise indicated all concentrations are for SF<sub>6</sub>. All times, unless otherwise indicated, are in Pacific Daylight Time (PDT). Wind speeds and direction are given in meters/sec and degrees, respectively. Atmospheric stability conditions are given in terms of Pasquill stability classes as explained by Turner (1970).

#### 3.1 Relation of Tracer Data to Industrial Pollutant Emissions

The measured tracer concentrations obtained during the field study can be converted to a specified pollutant concentration using the nomographs in Figures 3 and 4. In order to use the nomographs, the value of K, the ratio of the pollutant molecular weight (in grams) to the pollutant's existing or projected emission rate (in tons/day) must be specified. Any tracer concentration can then be converted to the concentration of the pollutant by picking the point along the specified K-line where the tracer concentration occurs. As examples, the projected emissions of NO<sub>x</sub> (in terms of NO<sub>2</sub>), SO<sub>2</sub>, and CO associated with the Dow complex have been used to specify the K values which are given in Table 5 and shown in the nomographs. A concentration of 100 ppt SF<sub>6</sub> converts to 2.93 ppb NO<sub>x</sub> (as NO<sub>2</sub>), 0.242 ppb SO<sub>2</sub>, and 4.99 ppb CO. Restrictions regarding the conversion procedure are discussed in Volume I. A summary of the preliminary estimates of emissions from

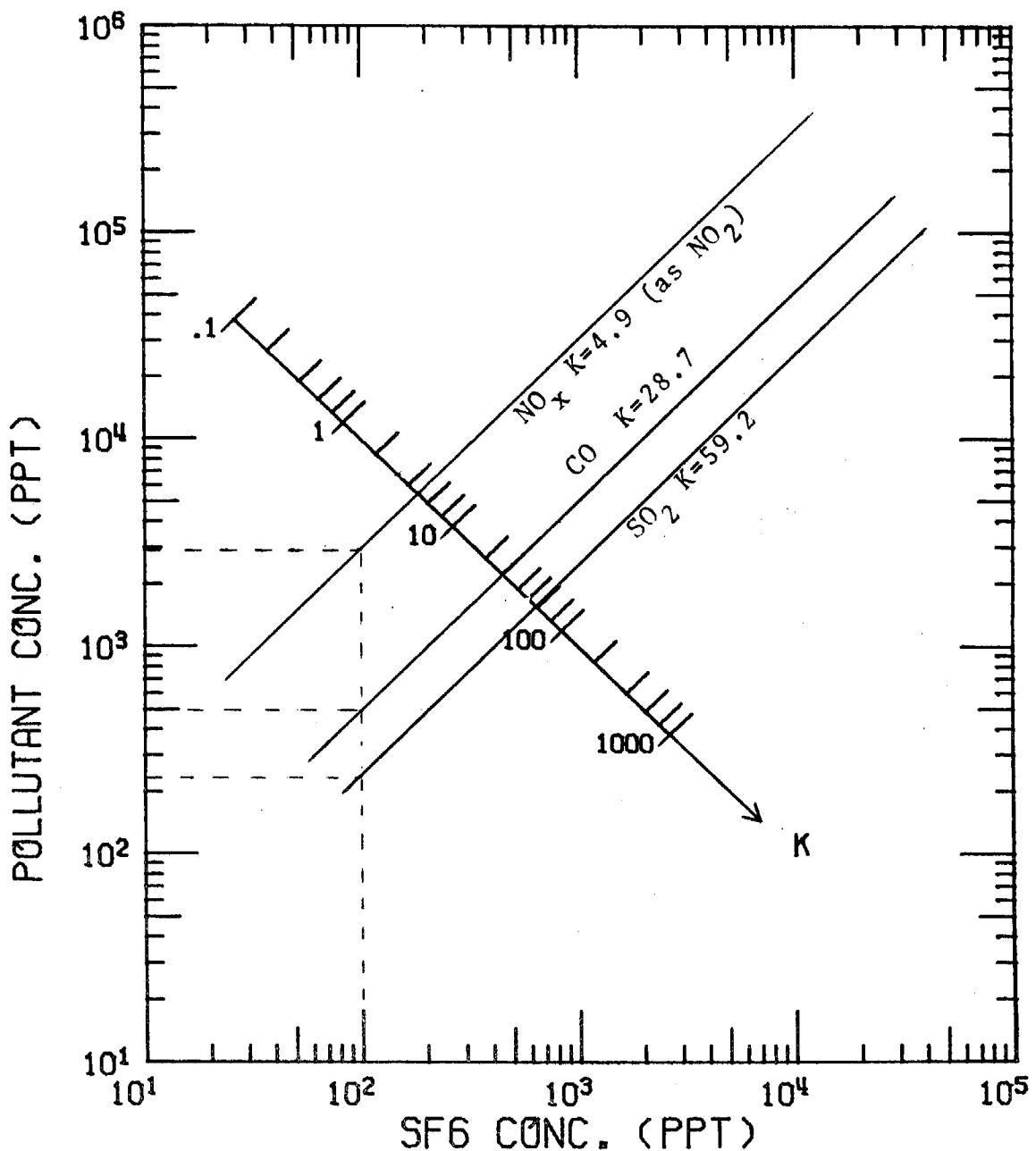


Figure 3. Conversion nomograph for converting SF<sub>6</sub> tracer concentrations measured during the field study to pollutant concentrations.  $K = (\text{pollutant molecular wt., grams}) / (\text{pollutant emission rate, tons/day})$ . Values of K shown above are based on projected pollutant emissions from the Montezuma Hills Dow chemical complex. Dashed line indicates the corresponding tracer-to-pollutant concentration conversions.

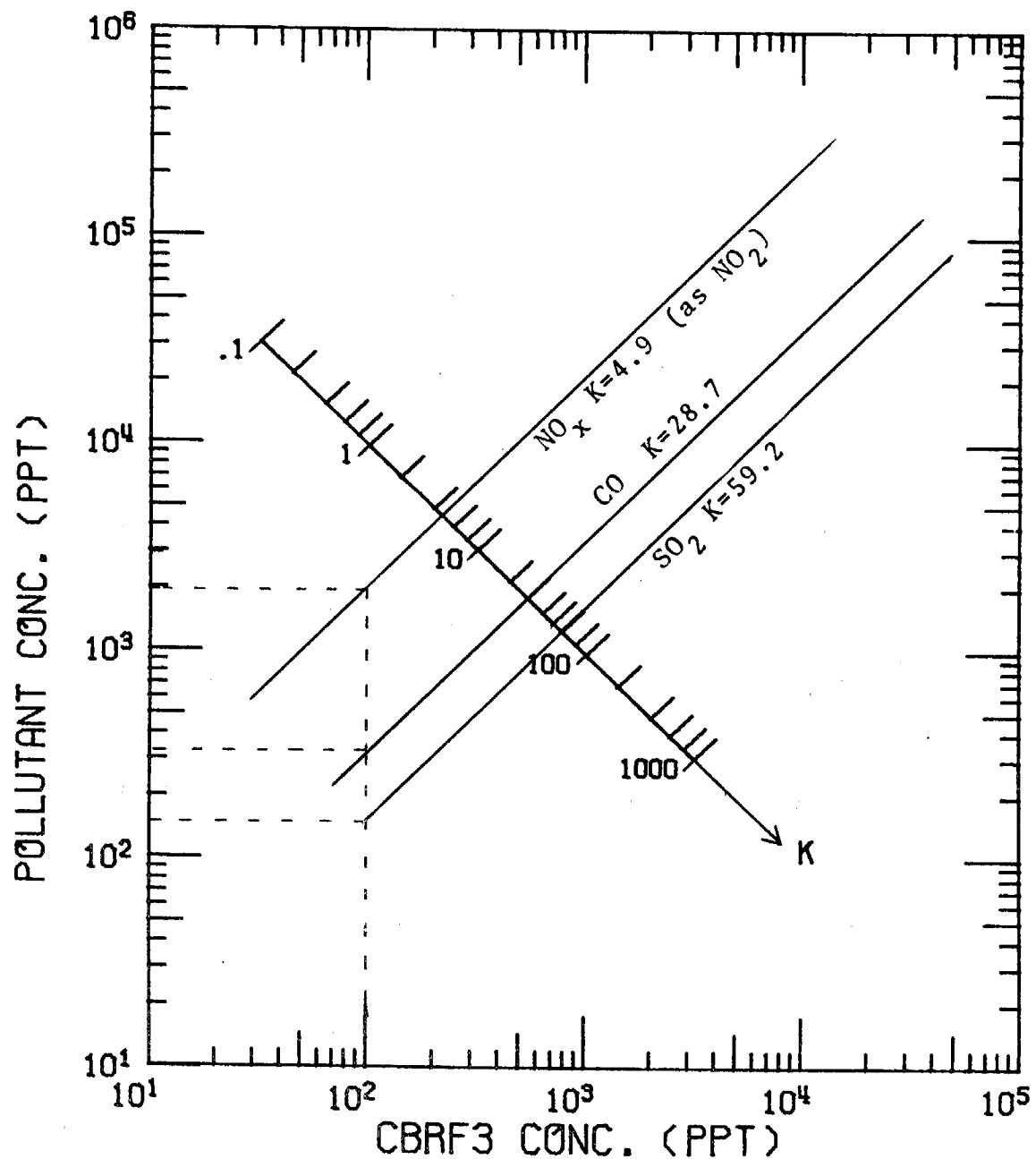


Figure 4. Conversion nomograph for converting CBrF<sub>3</sub> tracer concentrations measured during the field study to pollutant concentrations. K = (pollutant molecular wt, grams) / (pollutant emission rate, tons/day). Values of K shown above are based on projected pollutant emissions from the Montezuma Hills Dow chemical complex. Dashed line indicates the corresponding tracer-to-pollutant concentrations conversions.

TABLE 5

## NOMOGRAPH K-VALUES FOR PROJECTED DOW EMISSIONS\*

Pollutant	$MW_p$ (grams)	$RR_p^*$ (tons/day)	K Dow only	$RR_p^{**}$ Dow + Turbine	K Dow + Turbine
$NO_x$ (as $NO_2$ )	46	9.41	4.89	23.10	1.99
$SO_2$	64	1.08	59.2	1.252	51.12
CO	28	0.976	28.68	4.796	5.84
NMHC <sup>+</sup>	-	1.516	-	2.900	-

$MW_p$  = molecular weight of pollutant (grams/mole)

$RR_p$  = emission rate of pollutant (tons/day)

\* Projected Dow emissions for Montezuma Hills chemical complex from Moyer (1977).

\*\* Plans concerning the development of the Dow project indicated a 146 megawatt gas turbine might be necessary as an on-site power source. The emissions resulting from the operation of such a turbine were obtained from Moyer (1977).

+ Values of K for nonmethane hydrocarbons (NMHC) have not been calculated because the complex reaction mechanisms prevent simple descriptions of the rates of conversion.

the Dow project are given in Table 6 (Moyer, 1977).

The nomographs are based upon the following equation:

$$[P] = [T] \cdot \frac{RR_T}{MW_T} \cdot \frac{MW_P}{RR_P} = [T] \cdot \frac{K_T}{K_P}$$

where  $[P]$  is the pollutant concentration in ppt,  $[T]$  is the tracer concentration in ppt,  $RR_T$  and  $RR_P$  are the tracer and pollutant release rates in tons/day, respectively, and  $MW_T$  and  $MW_P$  are the associated molecular weights in grams. The terms  $K_T$  and  $K_P$  are the respective ratios of tracer and pollutant molecular weights to emission rates. K-lines shown in the nomographs are based on the average tracer release rates during the eight tests. This introduces only a small error (4%) since the release rates were relatively constant from test to test.

### 3.2 Overview of Tracer Data

The following maps provide an overview of the transport and dispersion of the tracer during the releases. Tracer concentrations from automobile and airborne traverses are plotted as a function of distance along the traverse in kilometers; note that the concentration scales differ from traverse to traverse. Wherever  $CBrF_3$  and  $SF_6$  were both observed, two plots of the traverse are shown. Overviews of the hourly averaged (12-hour board) data are shown in 12-hour bar graphs of the data for each sampling location.

26  
TABLE 6

## PRELIMINARY DOW MONTEZUMA AIR EMISSION ESTIMATIONS

Name of Process Facility	NO <sub>x</sub> (as NO <sub>2</sub> )	SO <sub>2</sub> (1b/hr)	CO	NMHC non-methane HC	TSP total suspended particles
1. Styrene	29.6	4.6	4.4	6.9	2.2
2. Ethylene	557.2	59.26	48.2	20.2	23.2
3. Benzene	23.4	3.6	3.5	1.6	1.8
4. Ethyl Benzene	4.3	0	0.5	12.37	0.3
5. Cumene	30.7	4.6	4.5	12.07	2.2
6. Phenol	31.4	5.0	4.7	5.3	2.3
7. HPDE	3.8	0	0.3	16.4	0.2
8. LDPE	0	0	0	37.5	0
8. Propylene Oxide	26.4	4.2	3.9	1.9	2.0
10. Caustic	32.9	5.0	4.9	1.1	2.4
11. VCM	40.1	3.8	5.4	9.0	2.8
12. Track & Car Loading	0	0	0	1.0	0
13. Incinerator	4	0	1.0	0	1.0
14. Ship Dock	0.7	0	0.05	1.0	0.04
TOTALS	784.5	90.06	81.35	126.34	40.44
TOTALS (tons/day)	9.414	1.081	0.9762	1.516	0.4853

## 146 MW CONSTANT LOAD NATURAL GAS-FIRED TURBINE

## Emission factors (1b/hr rated load)

	NO <sub>x</sub>	SO <sub>2</sub>	CO	HC	TSP
	7.81	0.098	2.18	0.79	0.27
Emissions (1b/hr)	1140.3	14.3	318.3	115.3	39.4
(tons/day)	13.68	0.1716	3.820	1.384	0.4728

## TOTAL EMISSIONS (PLANT + GAS TURBINE)

	NO <sub>x</sub>	SO <sub>2</sub>	CO	HC	TSP
1b/hr	1924.8	104.36	399.65	241.64	79.84
tons/day	23.10	1.252	4.796	2.900	0.958

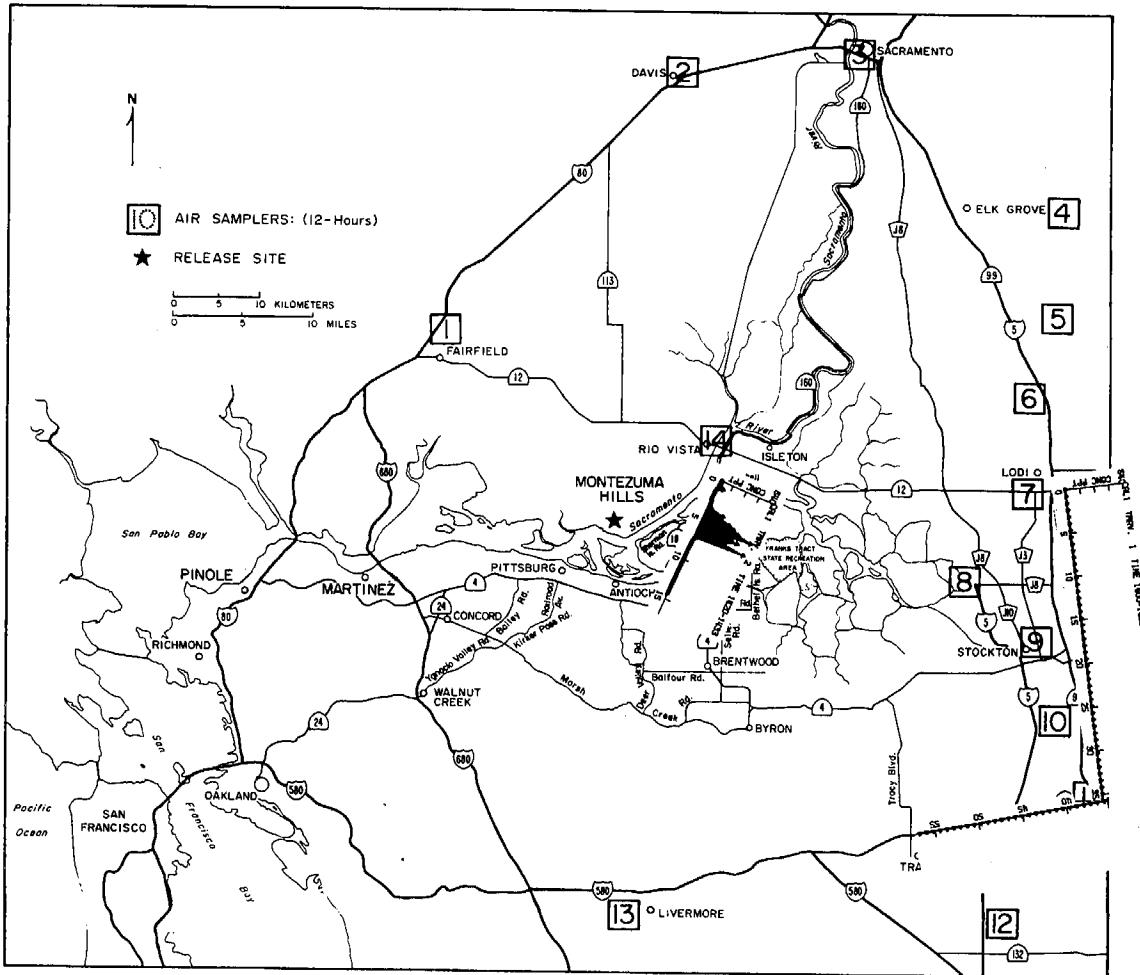


Figure 5.

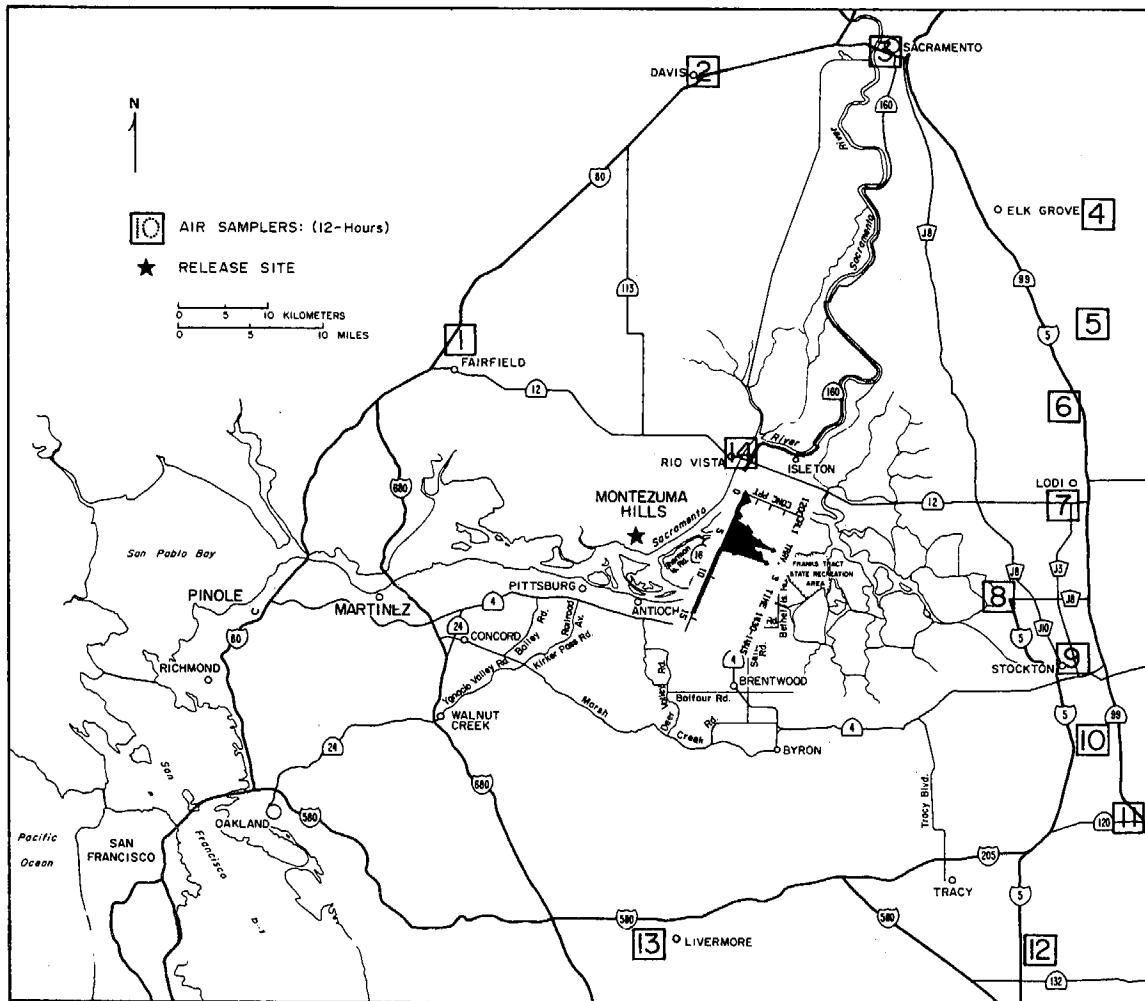
## TEST 1

8/31/76

## Auto Traverses:

- 1 1400 - 1450 PDT, SF<sub>6</sub>(max) = 0 ppt  
2 1420 - 1433 PDT, SF<sub>6</sub>(max) = 611 ppt

SF<sub>6</sub> released from the Montezuma Hills from 1200-1700 PDT.



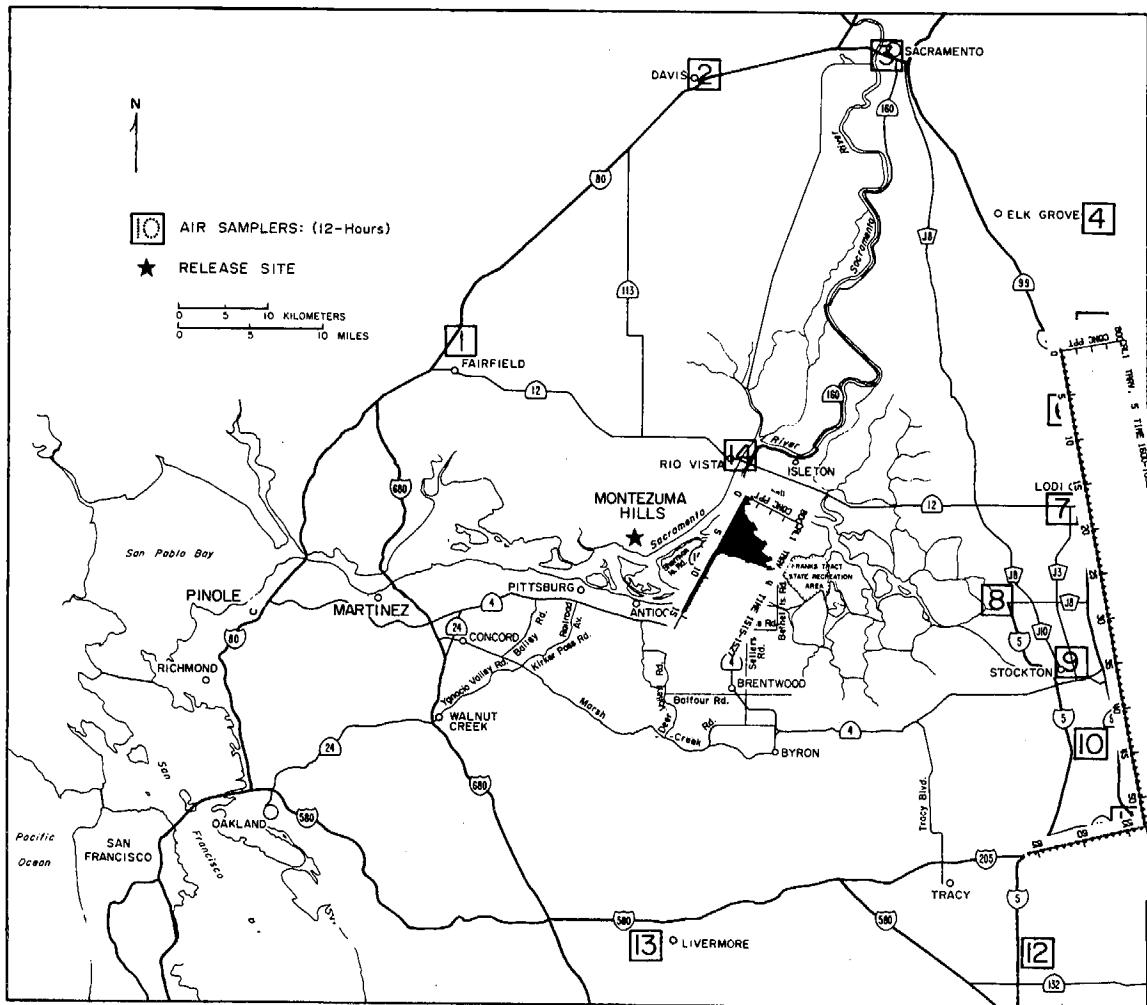


Figure 7.

TEST 1

8/31/76

## Auto Traverses:

4 1515 - 1527 PDT, SF<sub>6</sub>(max) = 756 ppt5 1600 - 1652 PDT, SF<sub>6</sub>(max) = 4 pptSF<sub>6</sub> released from the Montezuma Hills from 1200-1700 PDT.

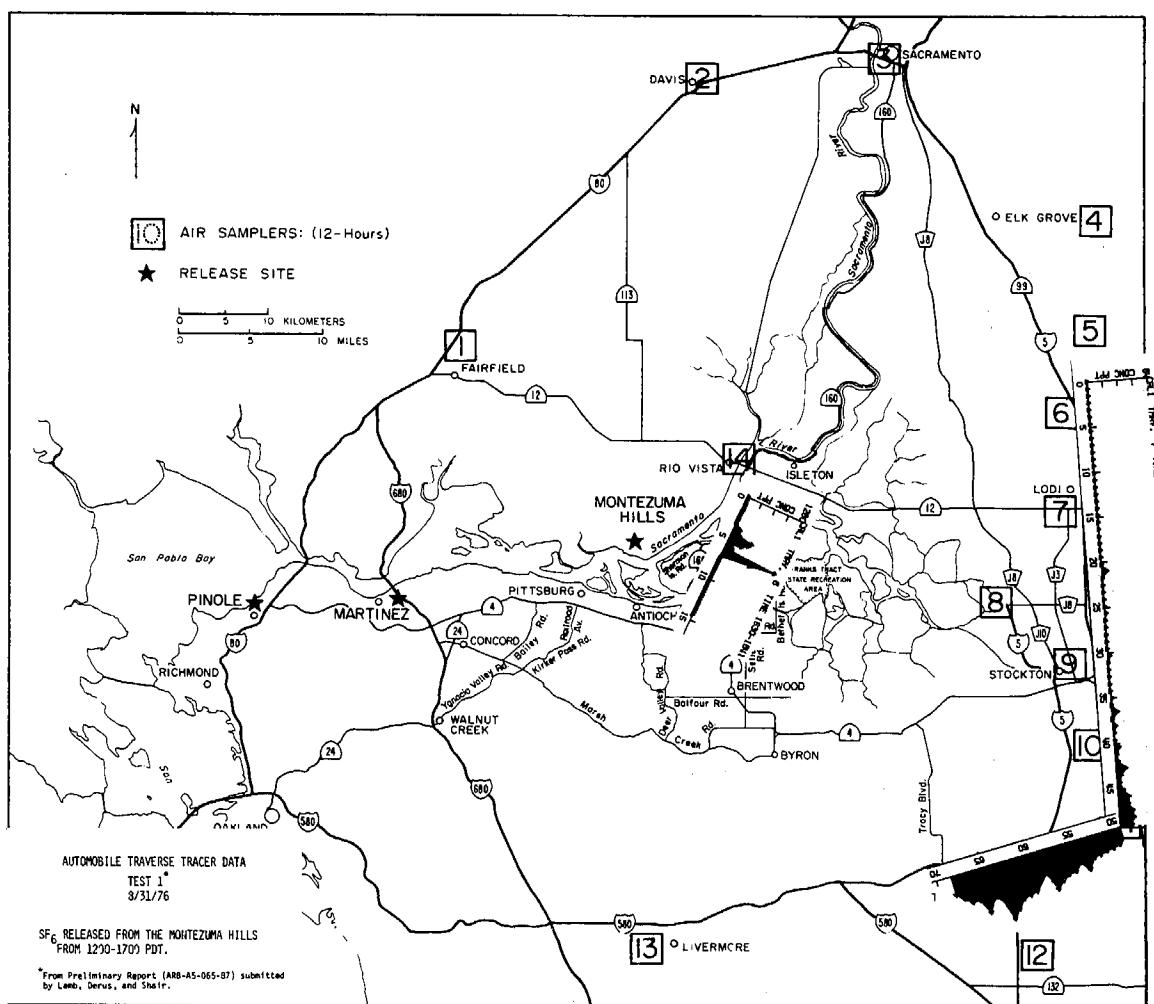
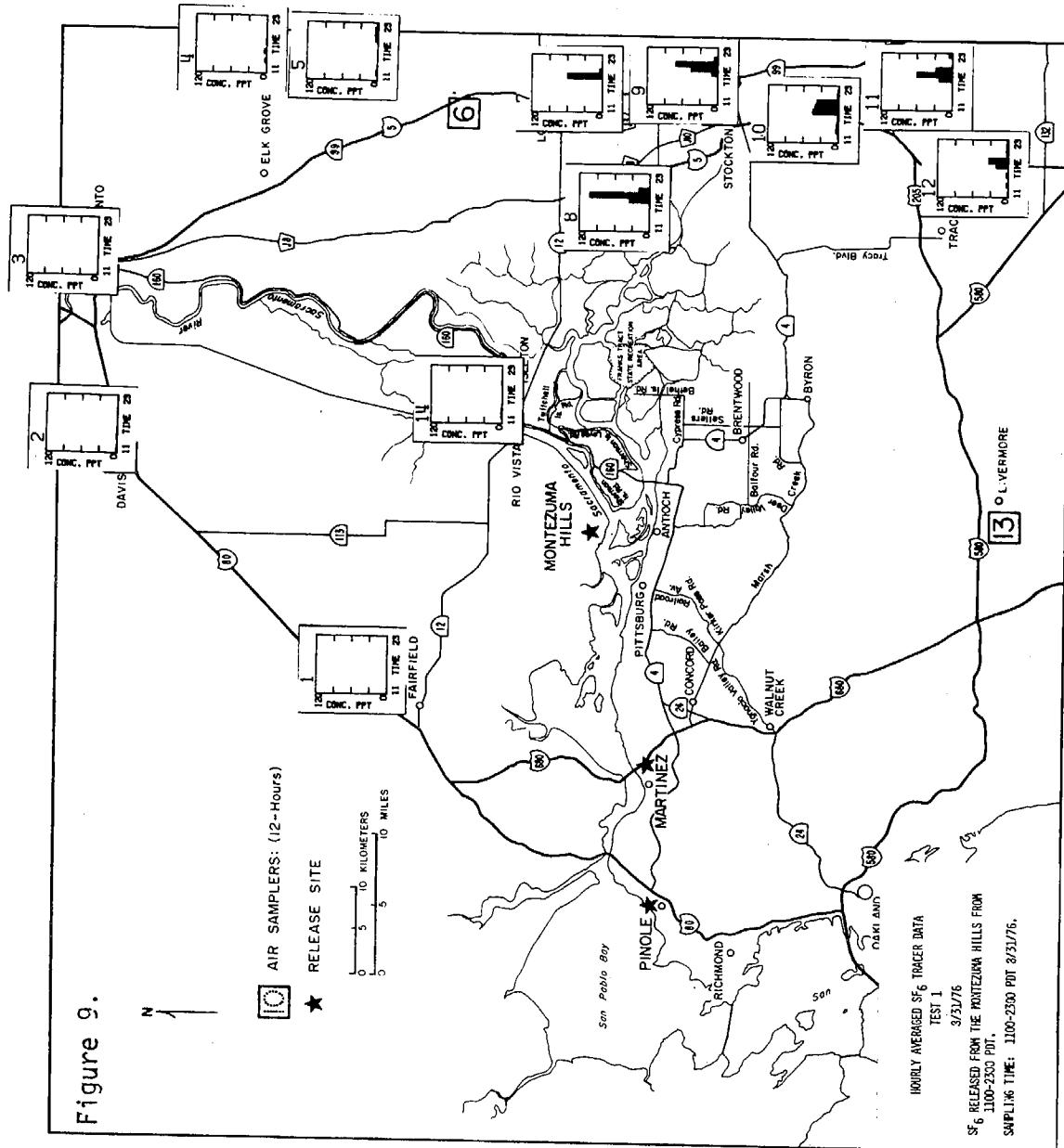
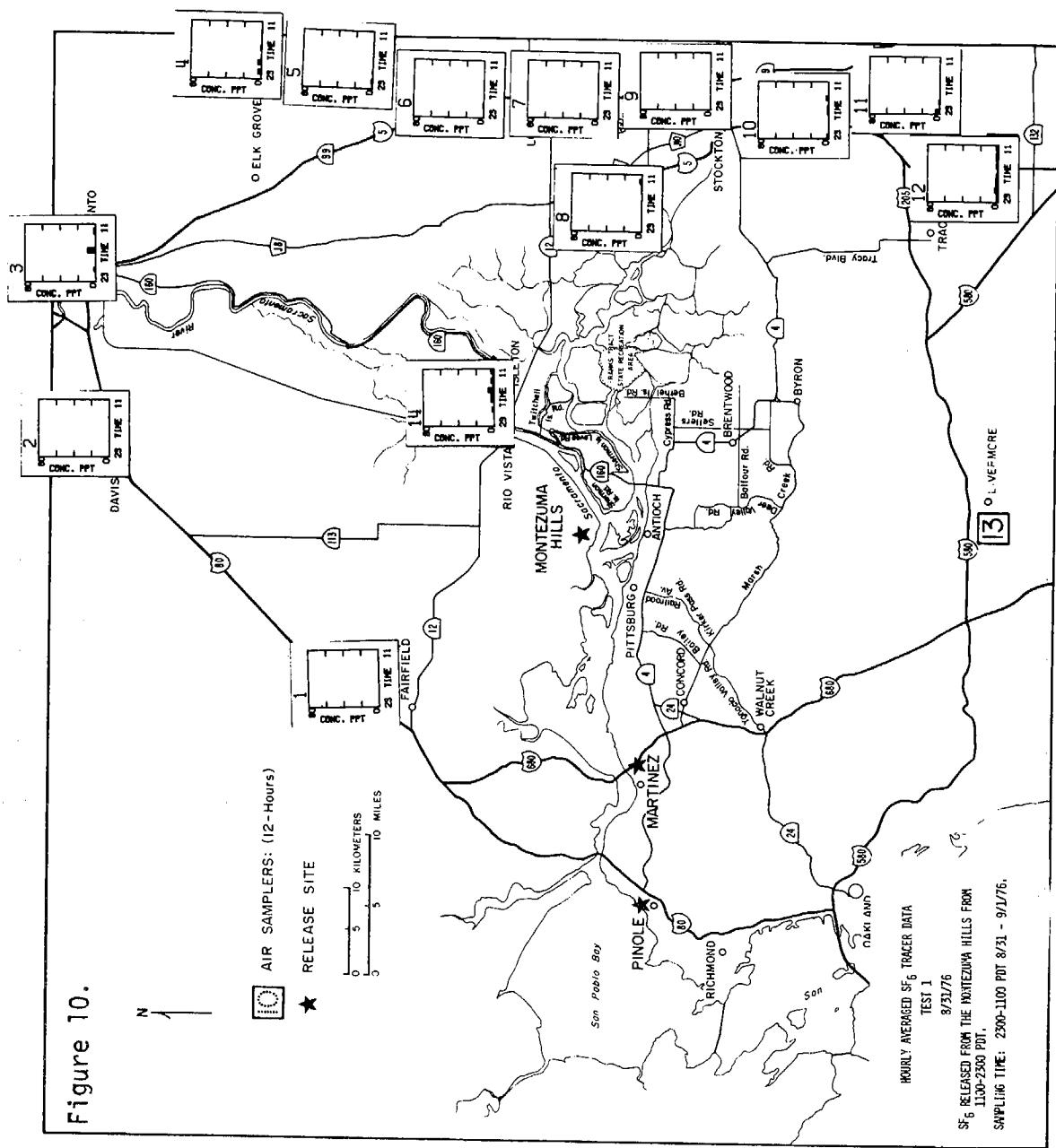


Figure 9.





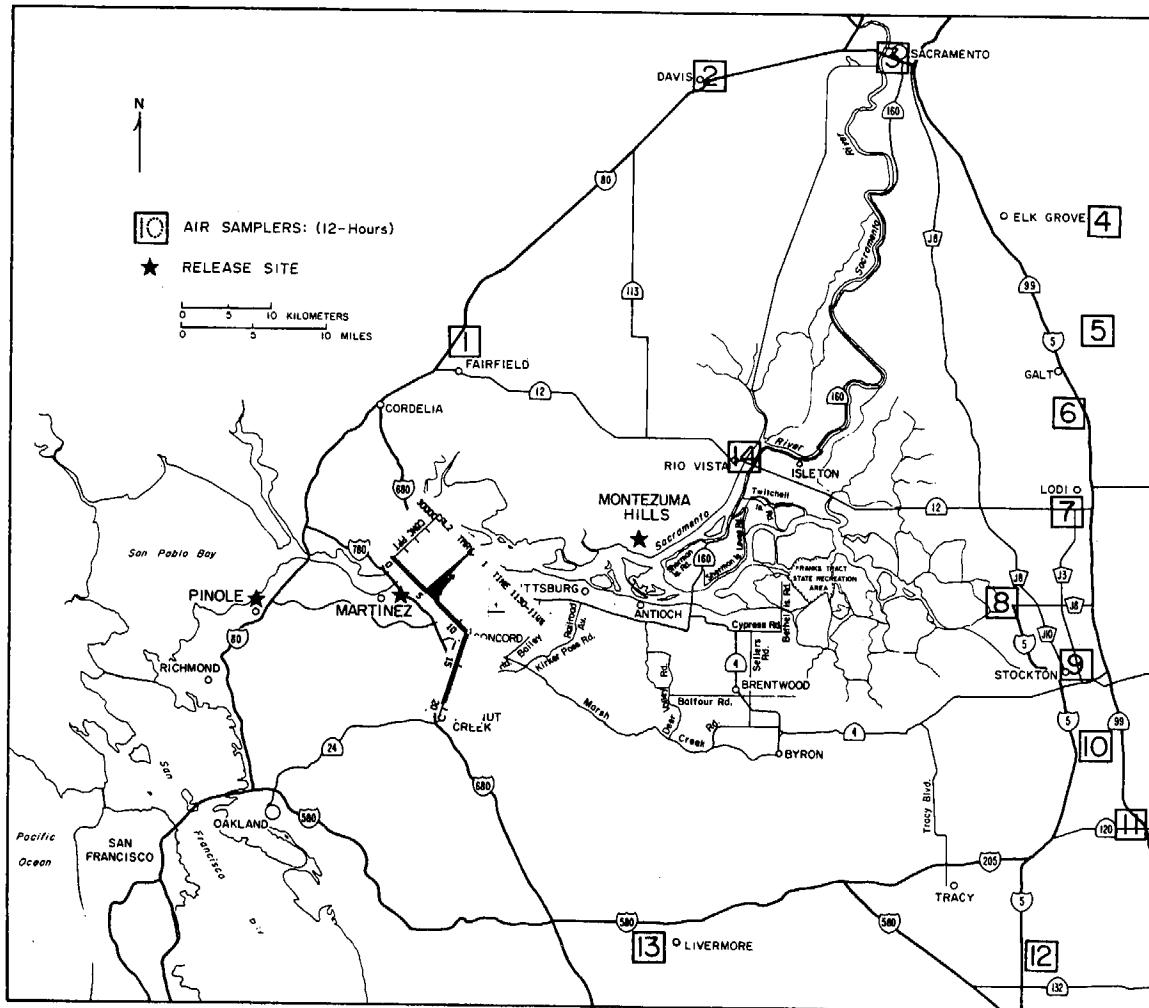


Figure 11.

## TEST 2

9/2/76

Auto Traverse:

1 1130 - 1144 PDT, SF<sub>6</sub>(max) = 30,000 pptSF<sub>6</sub> released from Martinez from 1100-1600 PDT.CBrF<sub>3</sub> released from the Montezuma Hills from 1300-1500 PDT.

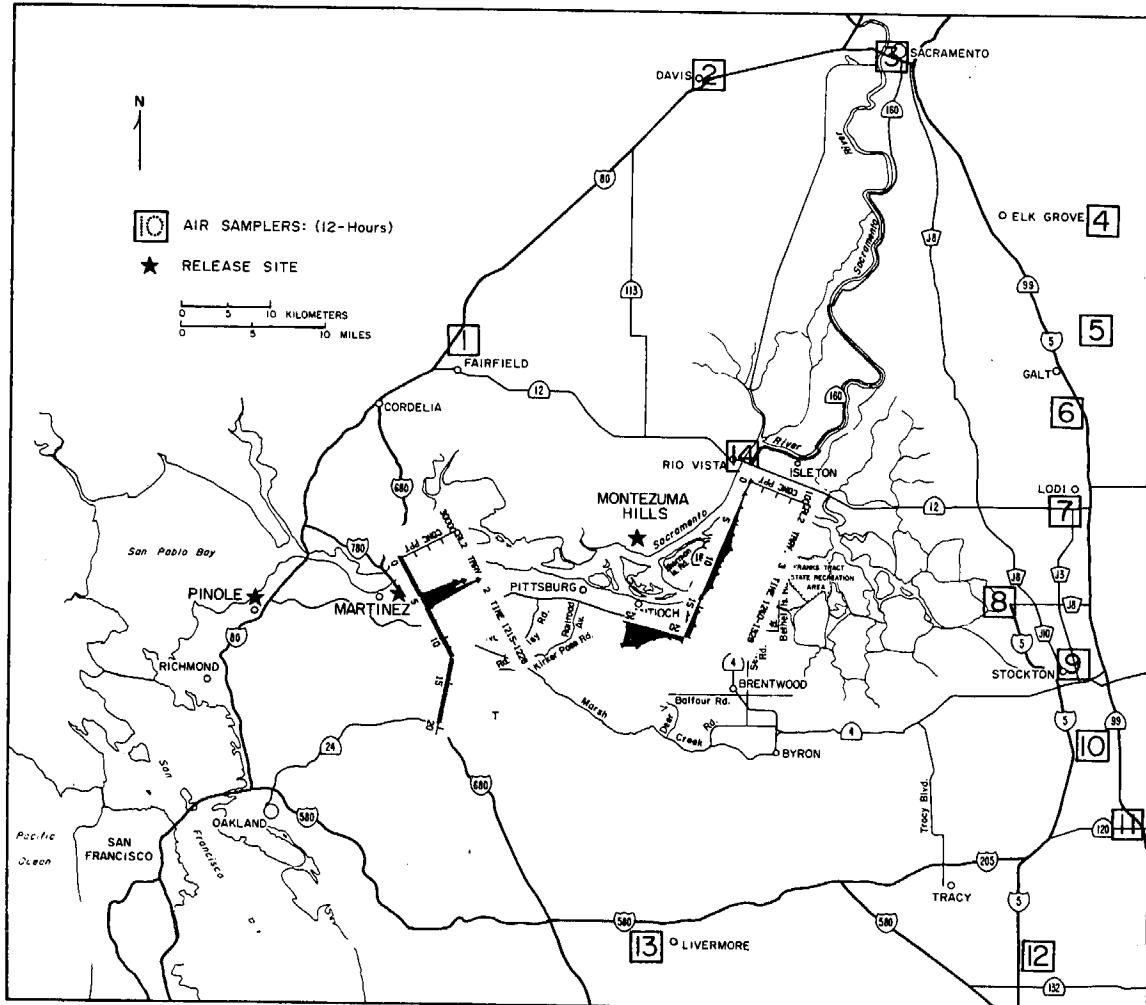


Figure 12.  
TEST 2  
9/2/76

Auto Traverses:

2 1215 - 1228 PDT, SF<sub>6</sub>(max) = 30,000 ppt

3 1240 - 1328 PDT, SF<sub>6</sub>(max) - 41 ppt

SF<sub>6</sub> released from Martinez from 1100-1600 PDT.

CBrF<sub>3</sub> released from the Montezuma Hills from 1300-1500 PDT.

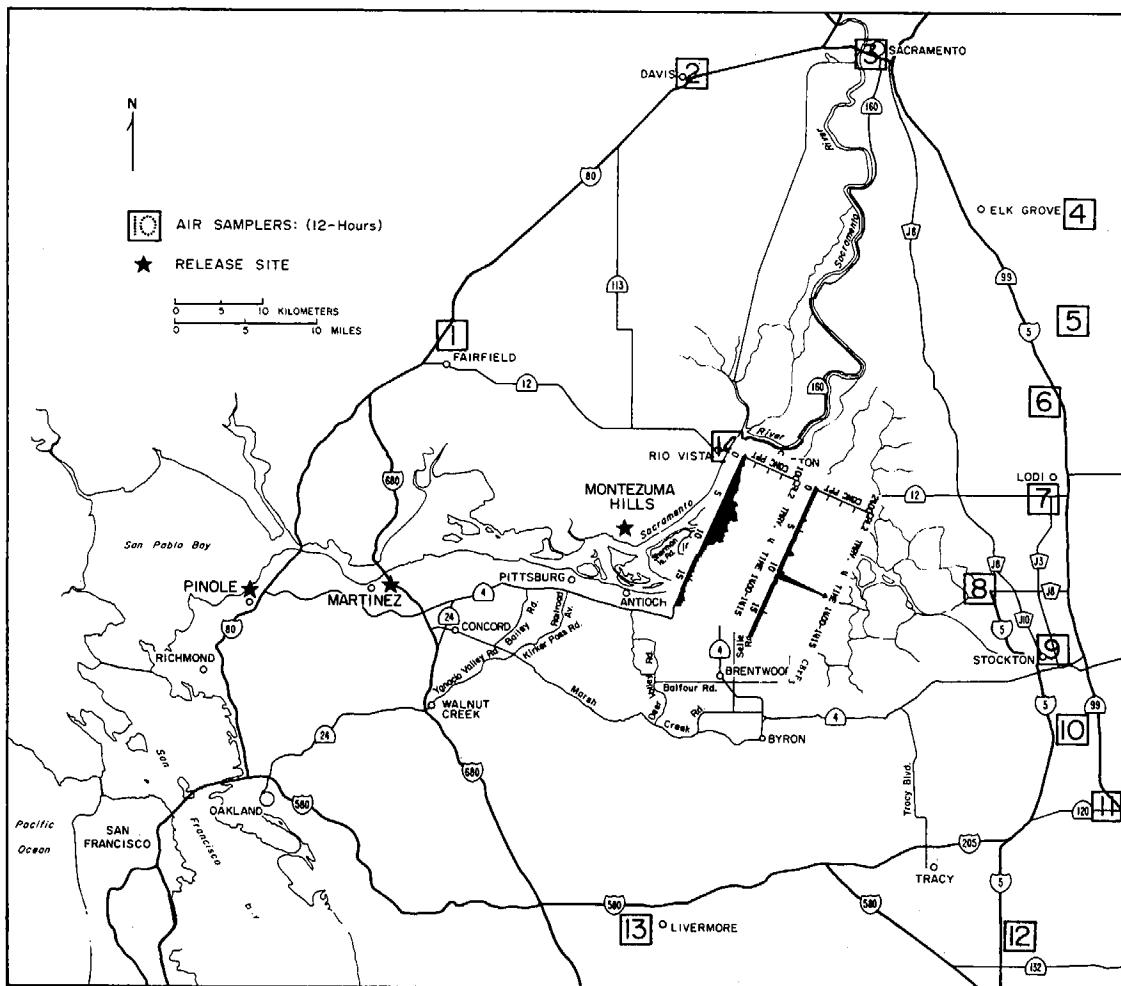


Figure 13.

TEST 2

9/2/76

## Auto Traverse:

4 1400-1415 PDT, SF<sub>6</sub> (max) = 33 ppt.1400-1415 PDT, CBrF<sub>3</sub> (max) = 2168 ppt.SF<sub>6</sub> released from Martinez from 1100-1600 PDT.CBrF<sub>3</sub> released from the Montezuma Hills from 1300-1500 PDT.

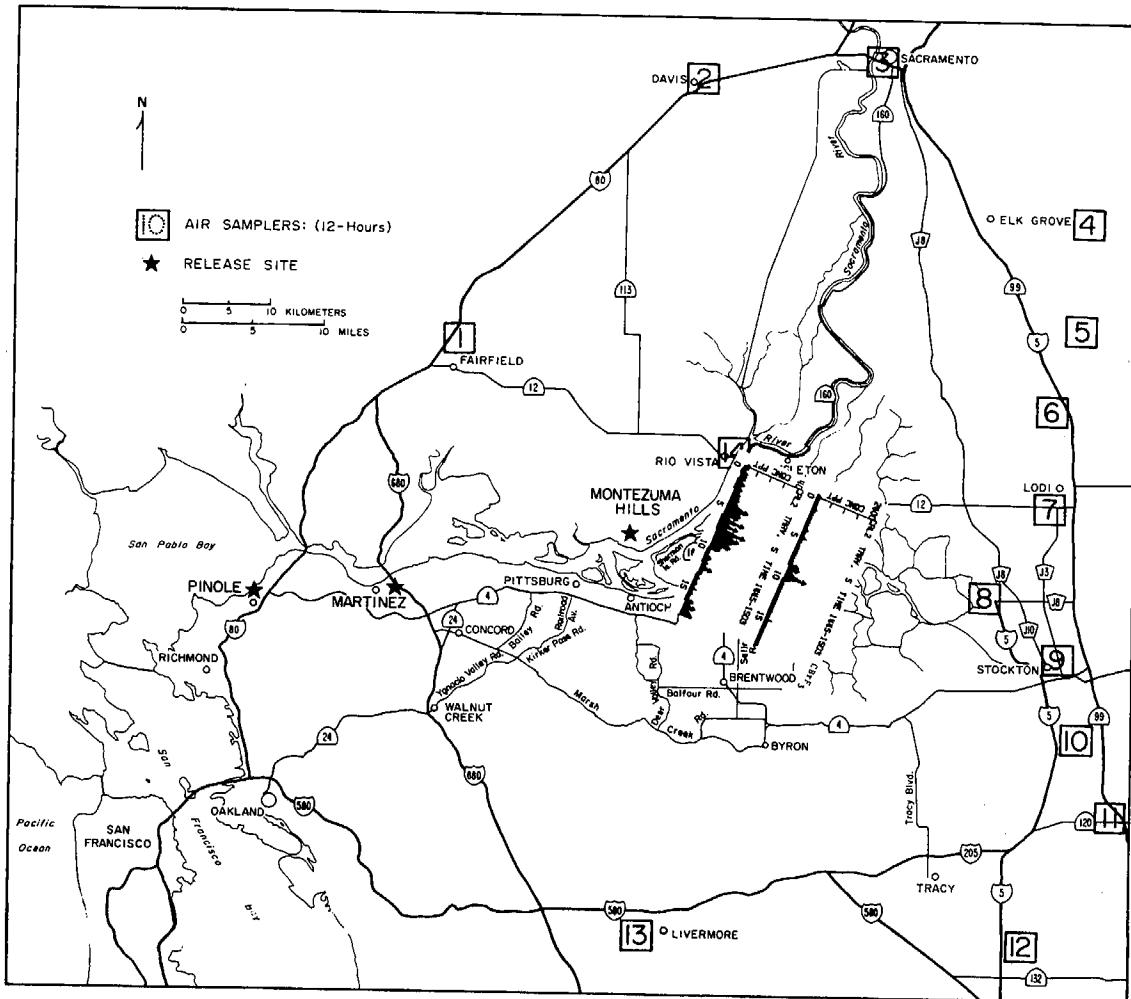


Figure 14.  
TEST 2  
9/2/76

Auto Traverse:

5 1445-1503 PDT,  $SF_6$  (max) = 19 ppt.

1445-1503 PDT,  $CBrF_3$  (max) = 840 ppt.

$SF_6$  released from Martinez from 1100-1600 PDT.

$CBrF_3$  released from the Montezuma Hills from 1300-1500 PDT.

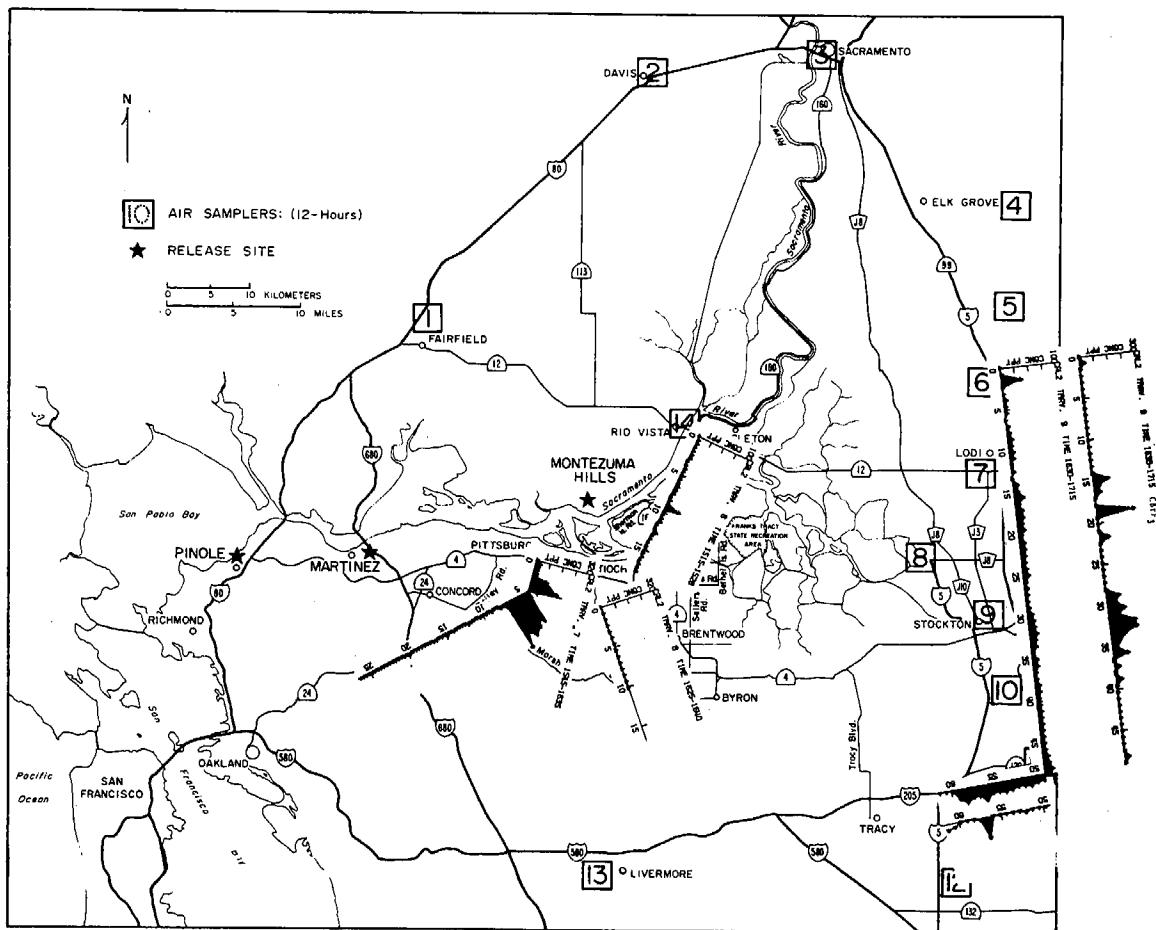


Figure 15.  
TEST 2  
9/2/76

Auto Traverses:

- 6 1515-1528 PDT, SF<sub>6</sub>(max) = 28 ppt
- 7 1545-1635 PDT, SF<sub>6</sub>(max) = 304 ppt.
- 8 1625-1640 PDT, SF<sub>6</sub>(max) = 3 ppt.
- 9 1630-1715 PDT, SF<sub>6</sub>(max) = 29 ppt.  
1630-1715 PDT, CBrF<sub>3</sub>(max) = 200 ppt.

SF<sub>6</sub> released from Martinez from 1100-1600 PDT.  
CBrF<sub>3</sub> released from the Montezuma Hills from 1300-1500 PDT.

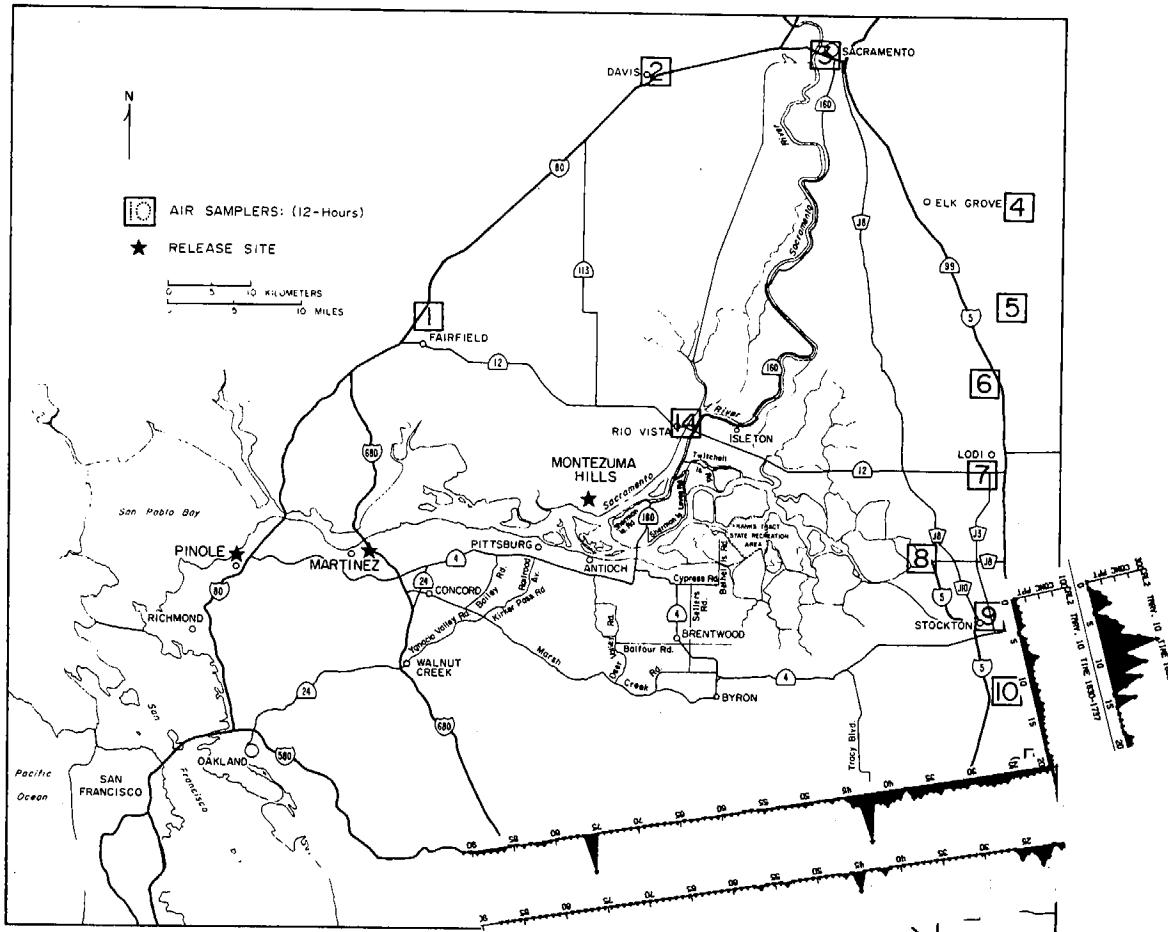


Figure 16.

TEST 2

9/2/76

## Auto Traverse:

10 1630-1737 PDT,  $SF_6$ (max) = 91 ppt.1630-1737 PDT,  $CBrF_3$ (max) = 300 ppt. $SF_6$  released from Martinez from 1100-1600 PDT. $CBrF_3$  released from the Montezuma Hills from 1300-1500 PDT.

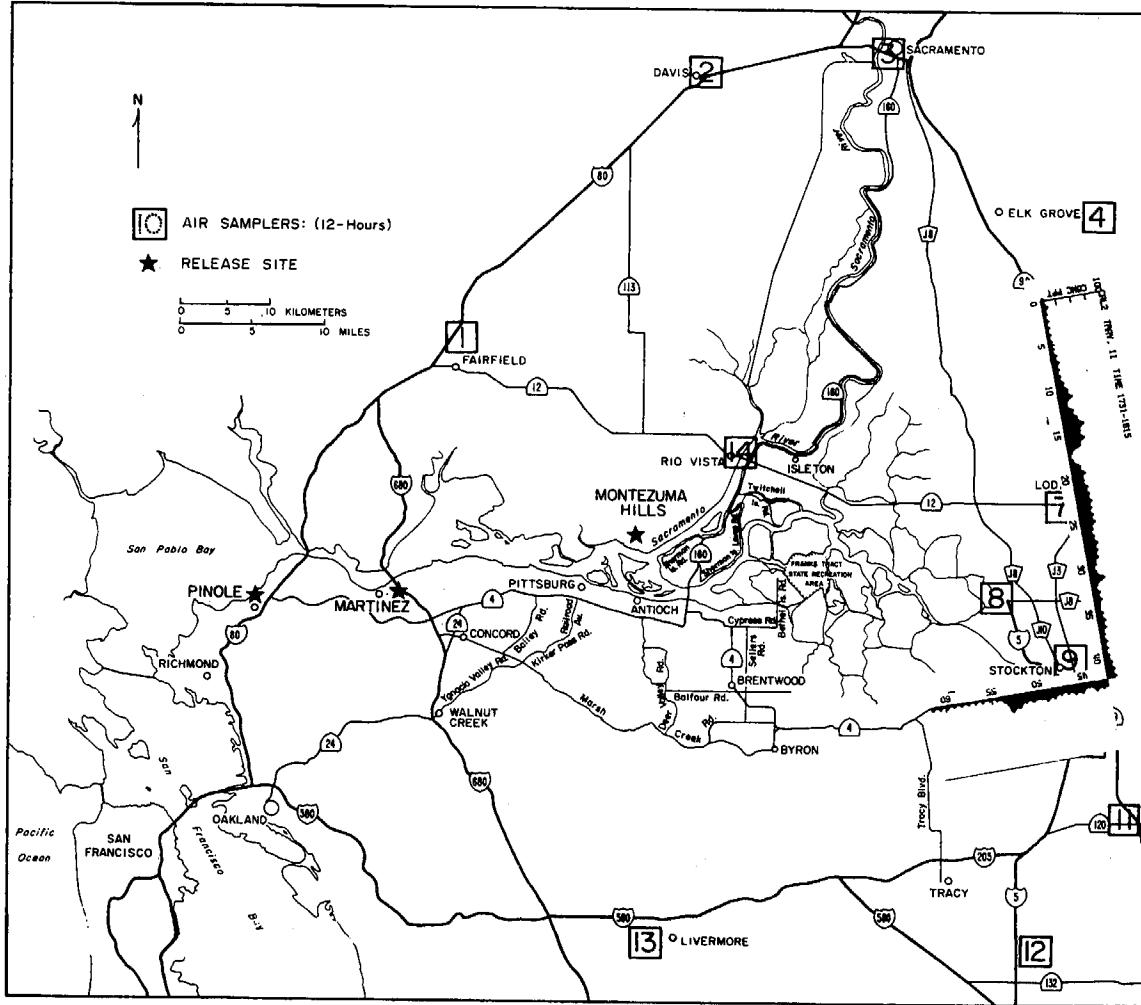


Figure 17.

TEST 2

9/2/76

## Auto Traverse:

11 1731 - 1815 PDT,  $SF_6$ (max) = 32 ppt $SF_6$  released from Martinez from 1100-1600 PDT. $CBrF_3$  released from the Montezuma Hills from 1300-1500 PDT.

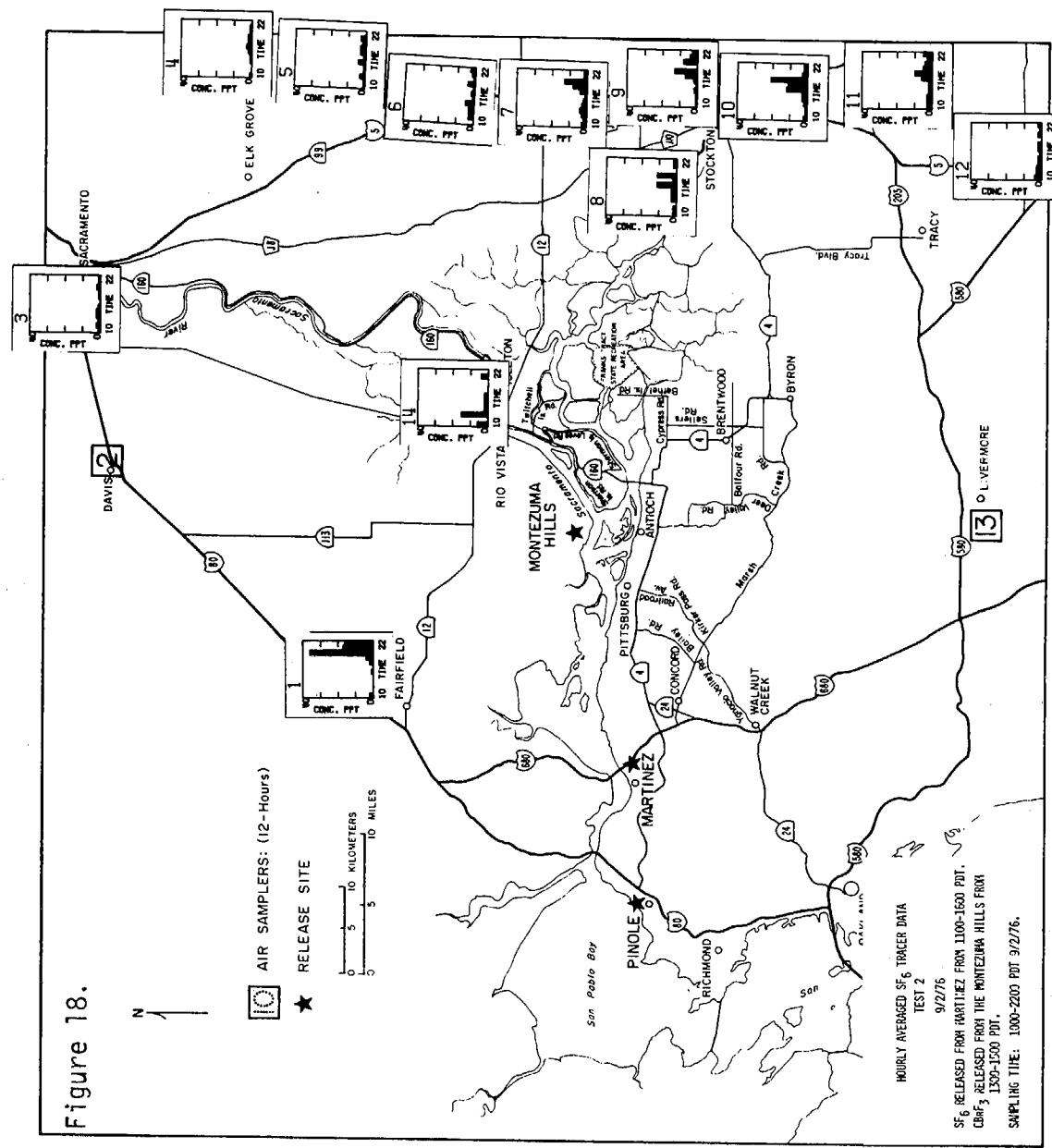
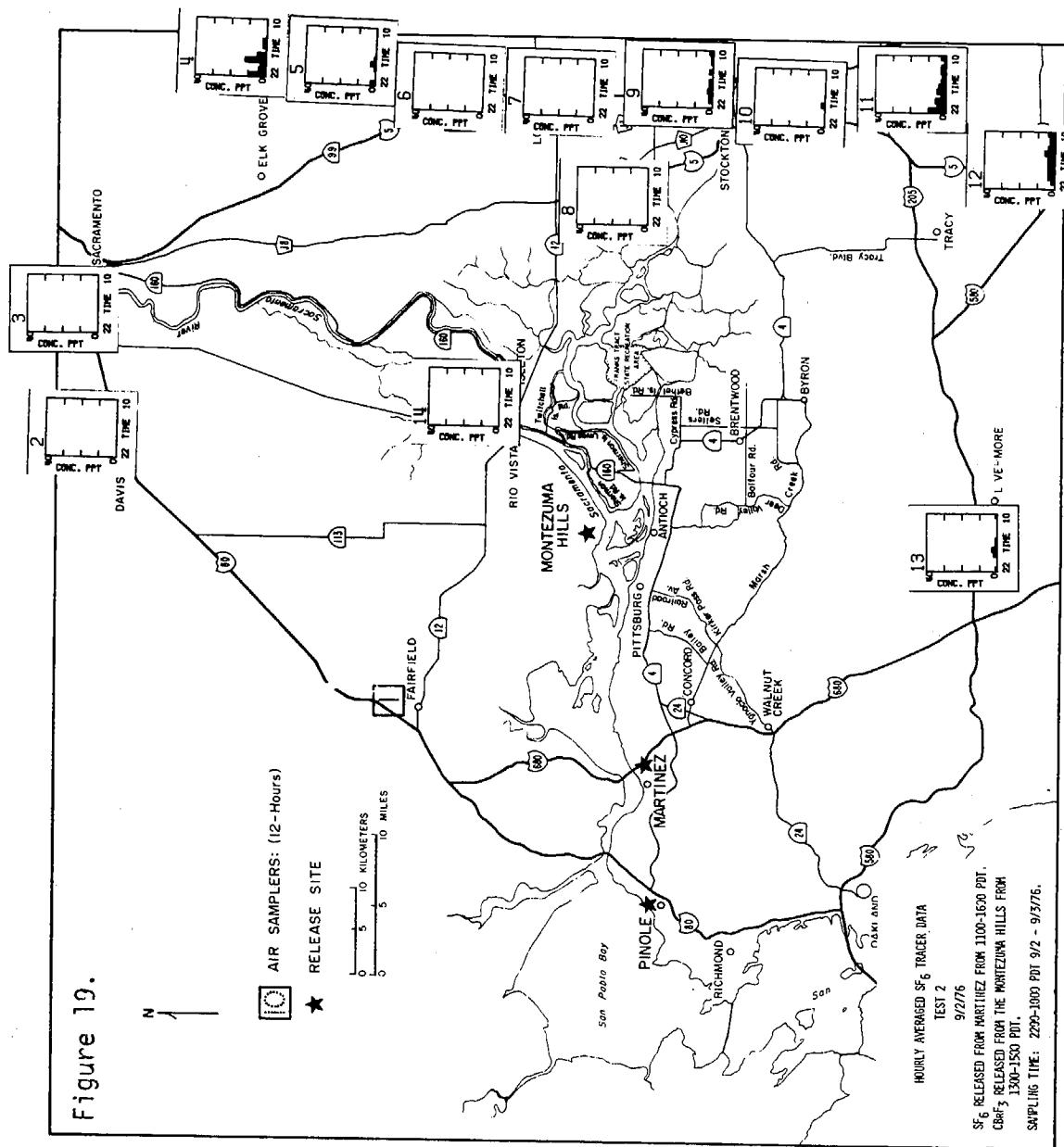


Figure 19.



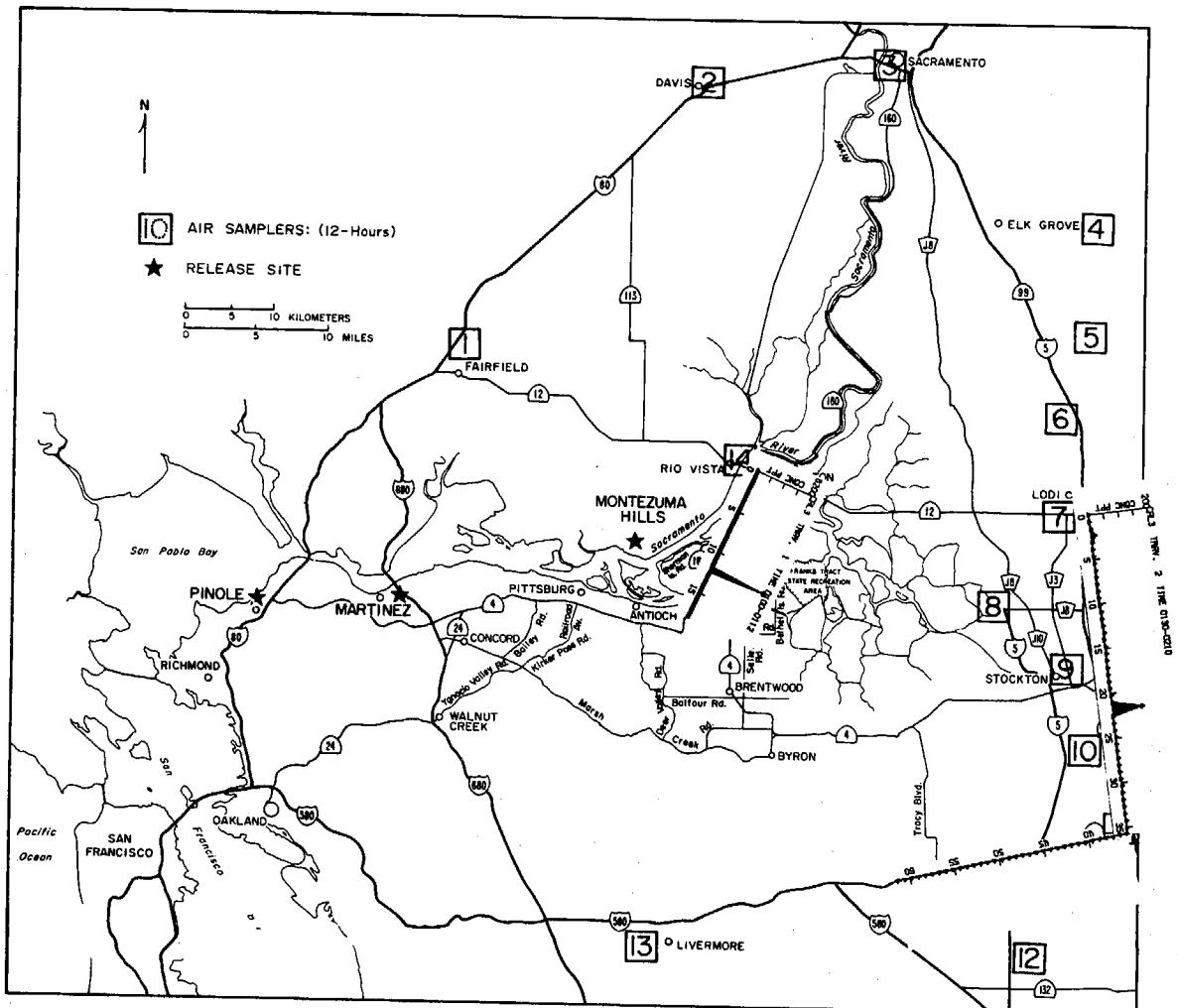


Figure 20.

## TEST 3

9/5/76

## Auto Traverses:

1 0100 - 0112 PDT, SF<sub>6</sub>(max) = 8146 ppt

2 0130 - 0210 PDT, SF<sub>6</sub>(max) = 104 ppt

SF<sub>6</sub> released from the Montezuma Hills from 0000-0500 PDT.

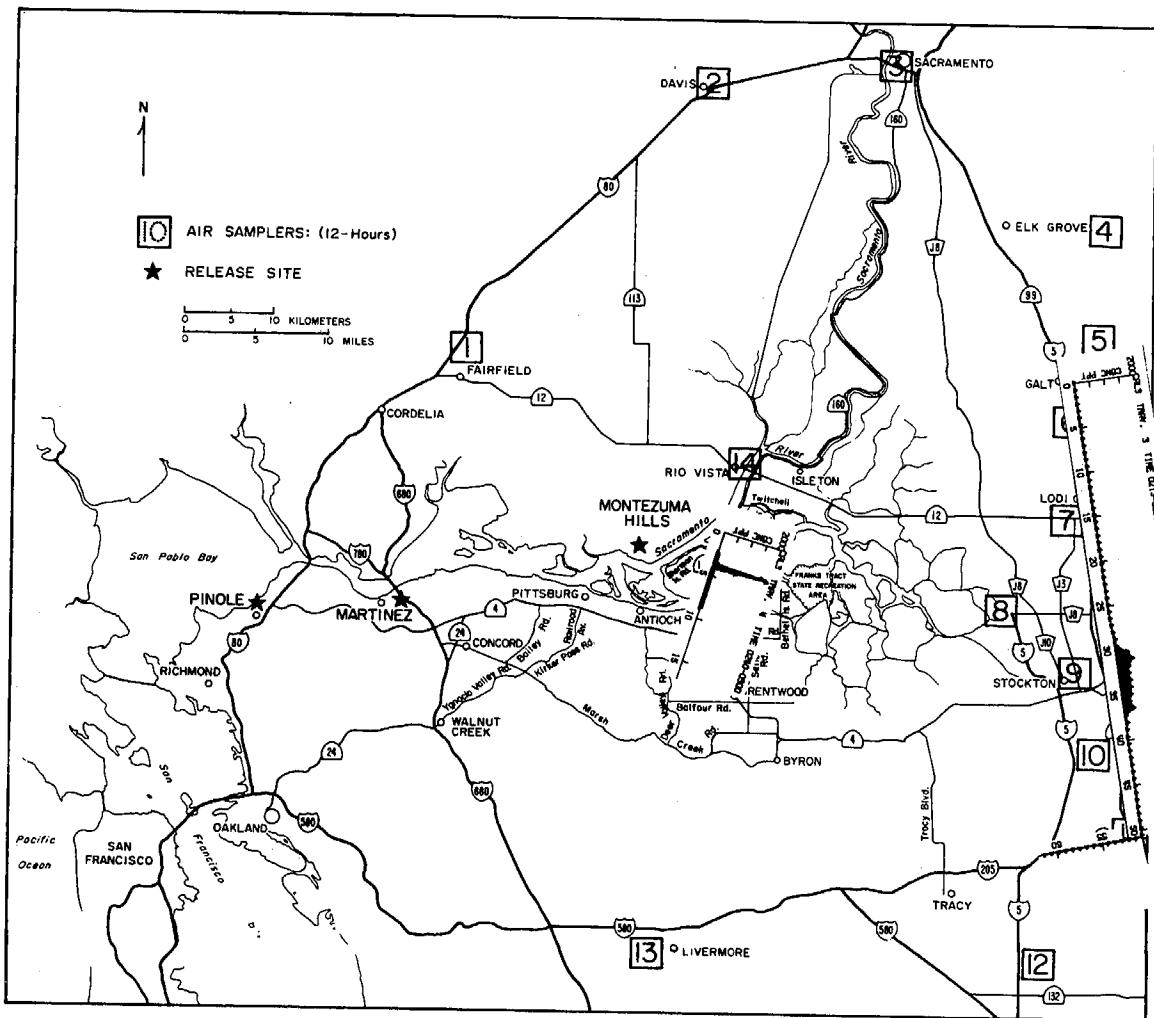


Figure 21.

## TEST 3

9/5/76

## Auto Traverses:

3 0213 - 0259 PDT, SF<sub>6</sub>(max) = 537 ppt

4 0240 - 0300 PDT, SF<sub>6</sub>(max) = 1856 ppt

$SF_6$  released from the Montezuma Hills from 0000-0500 PDT.

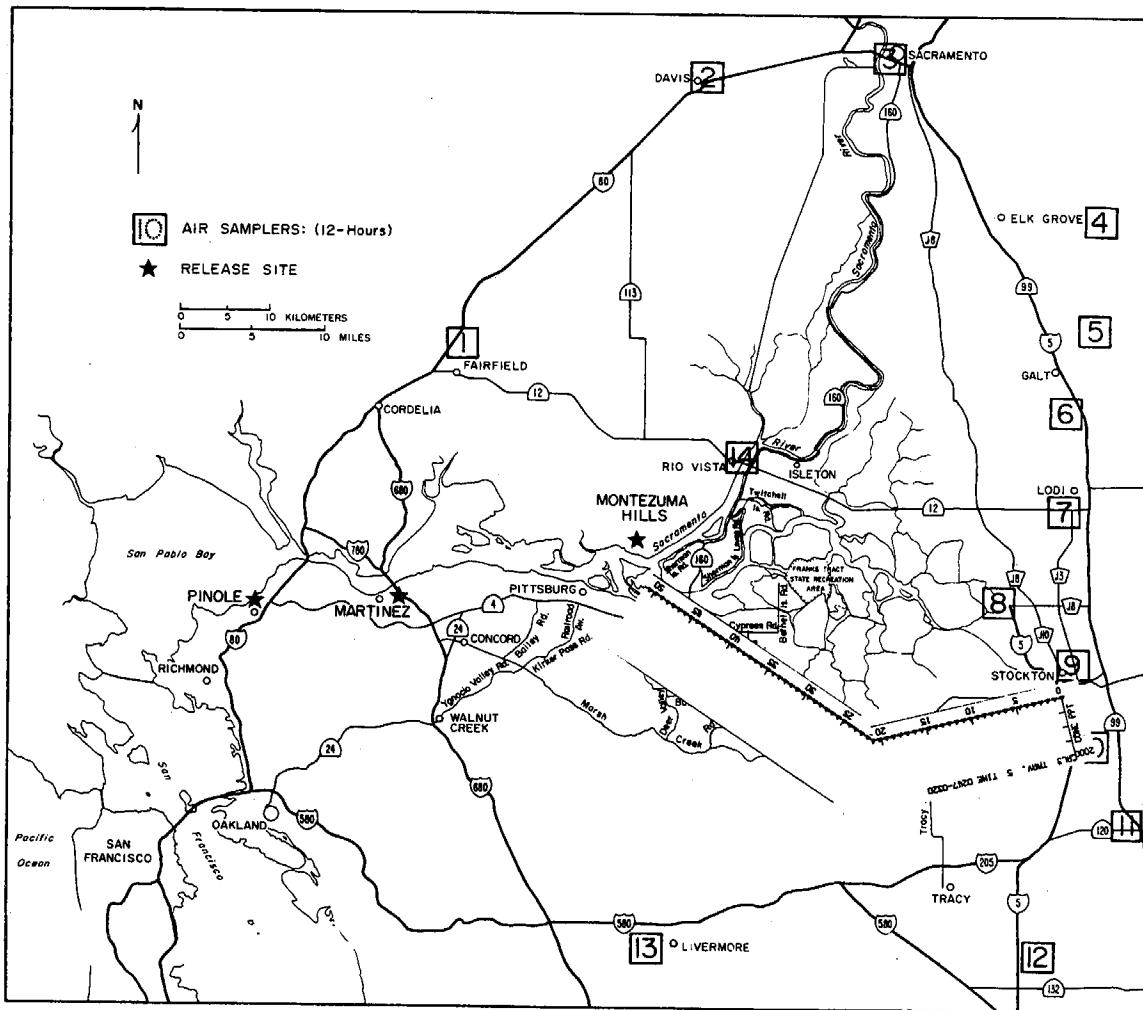


Figure 22.

TEST 3

9/5/76

Auto Traverse:

5 0247 - 0320 PDT, SF<sub>6</sub>(max) = 3 pptSF<sub>6</sub> released from the Montezuma Hills from 0000-0500 PDT.

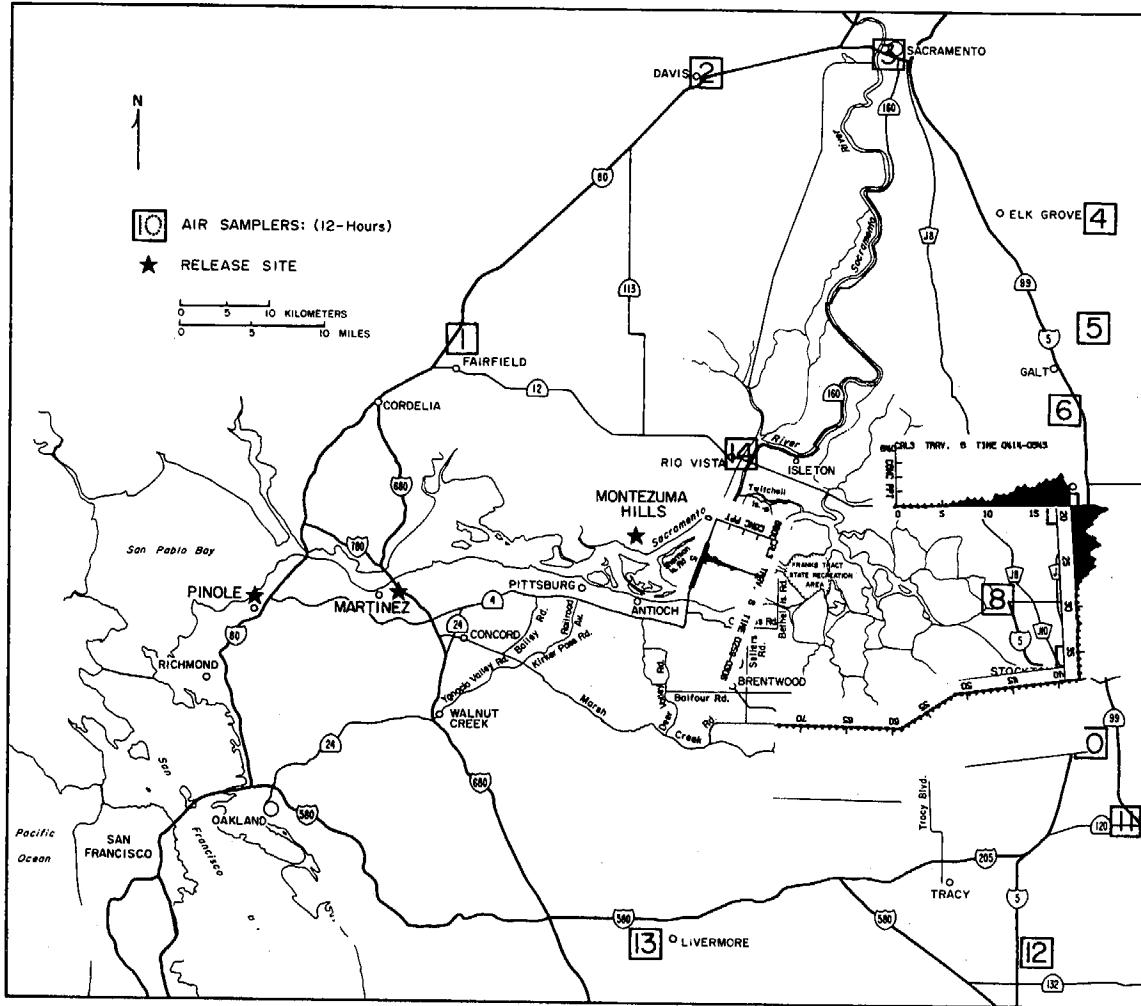


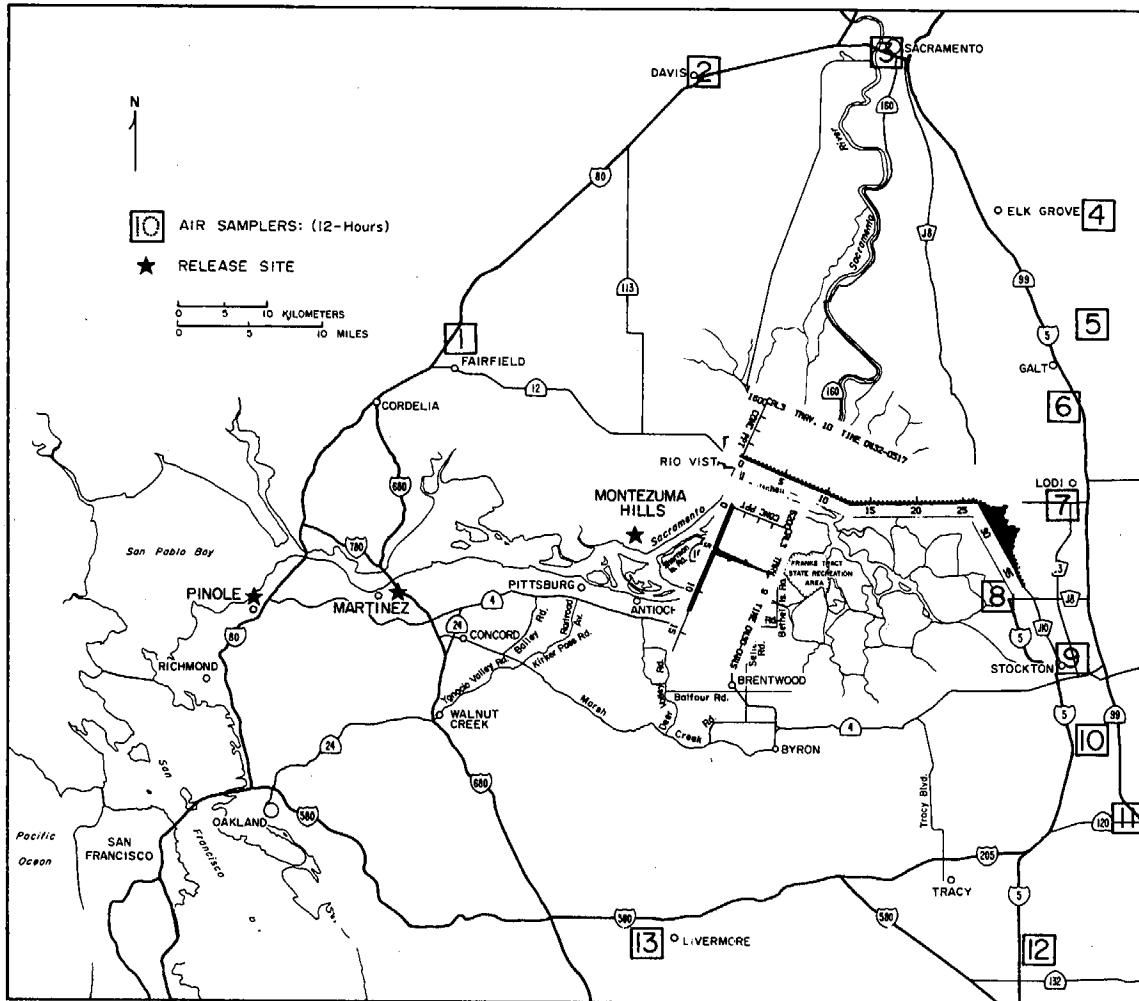
Figure 23.

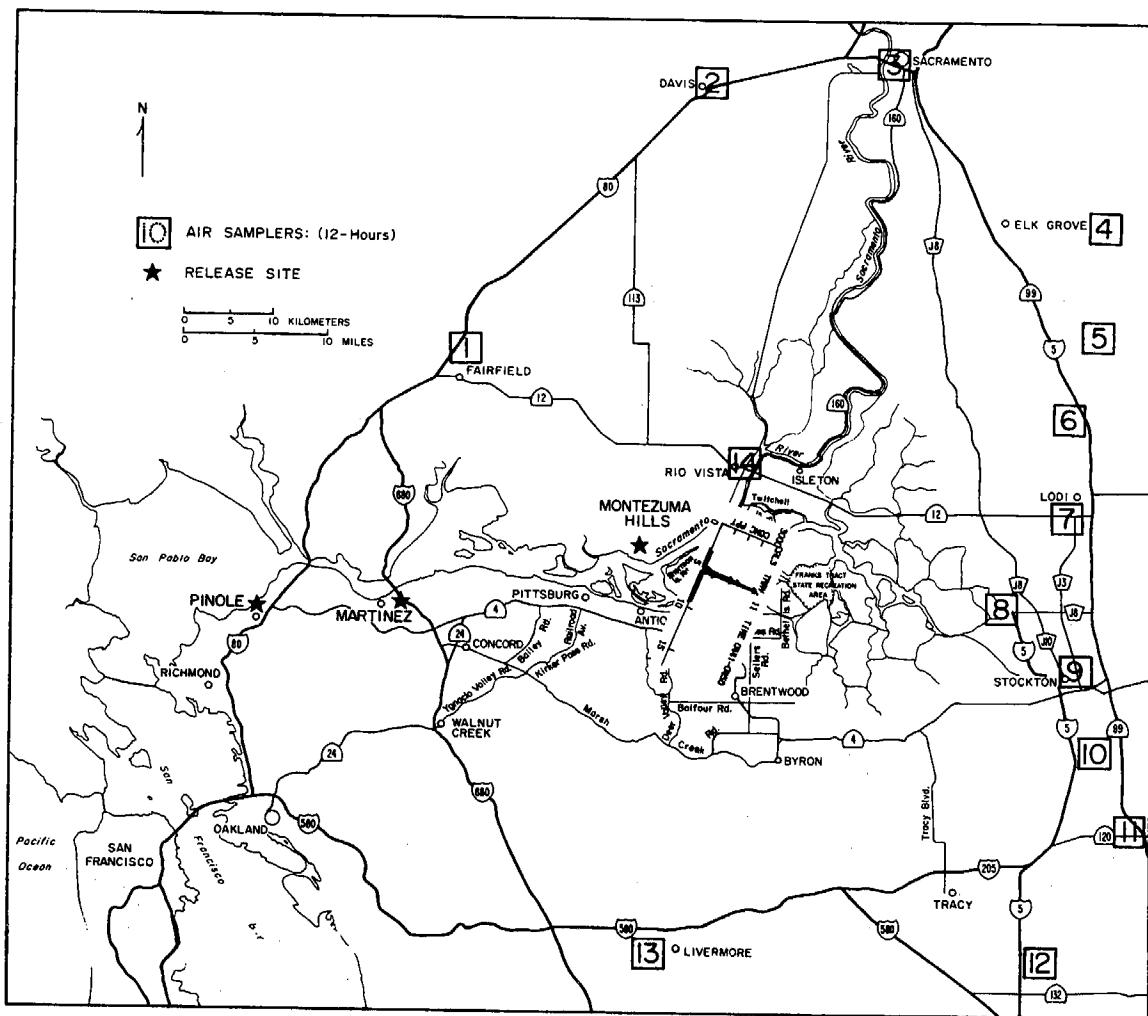
## TEST 3

9/5/76

## Auto Traverses:

6 0259 - 0306 PDT, SF<sub>6</sub> (max) = 8660 ppt8 0414 - 0545 PDT, SF<sub>6</sub> (max) = 370 pptSF<sub>6</sub> released from the Montezuma Hills from 0000-0500 PDT.





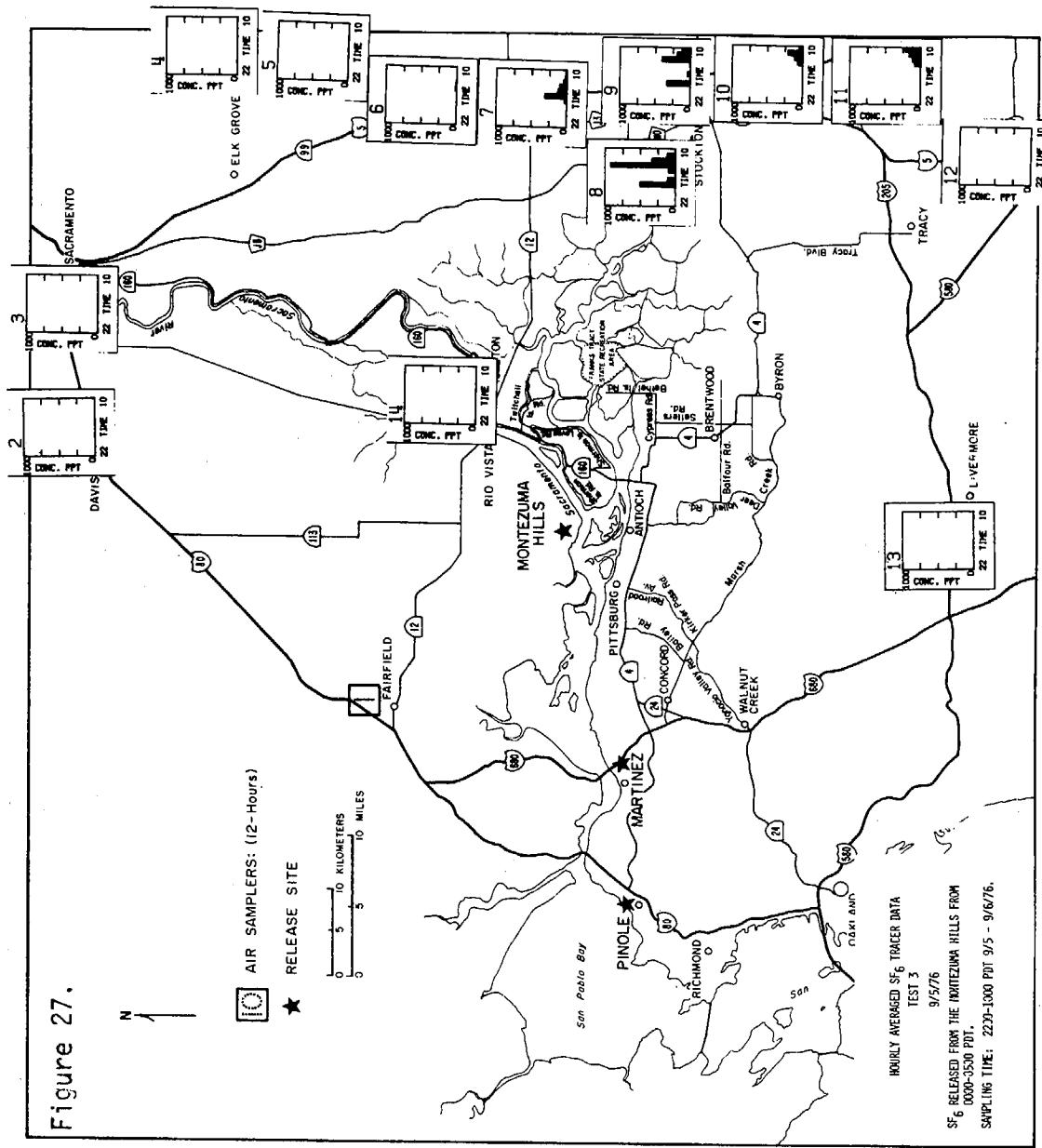
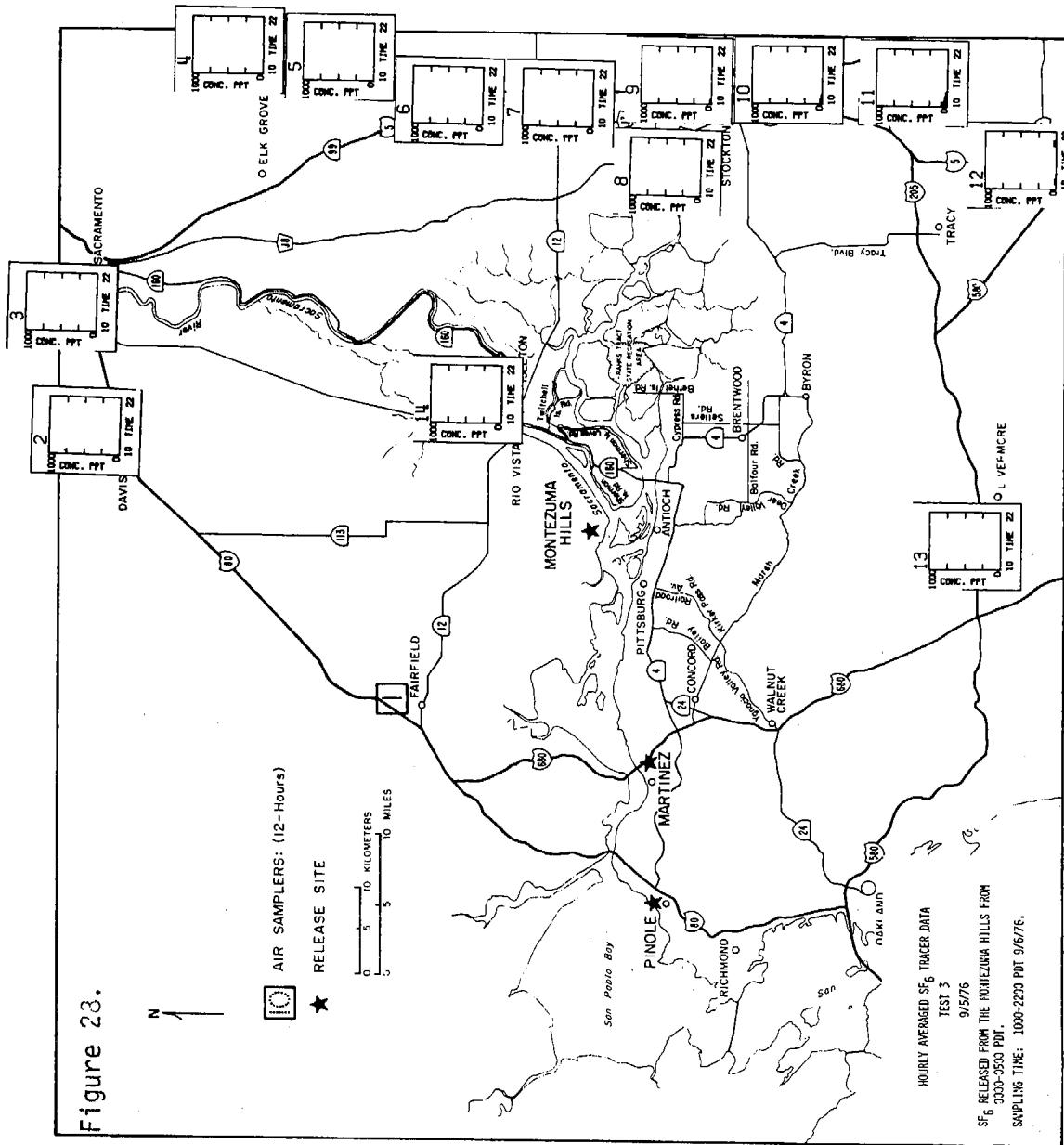


Figure 23.



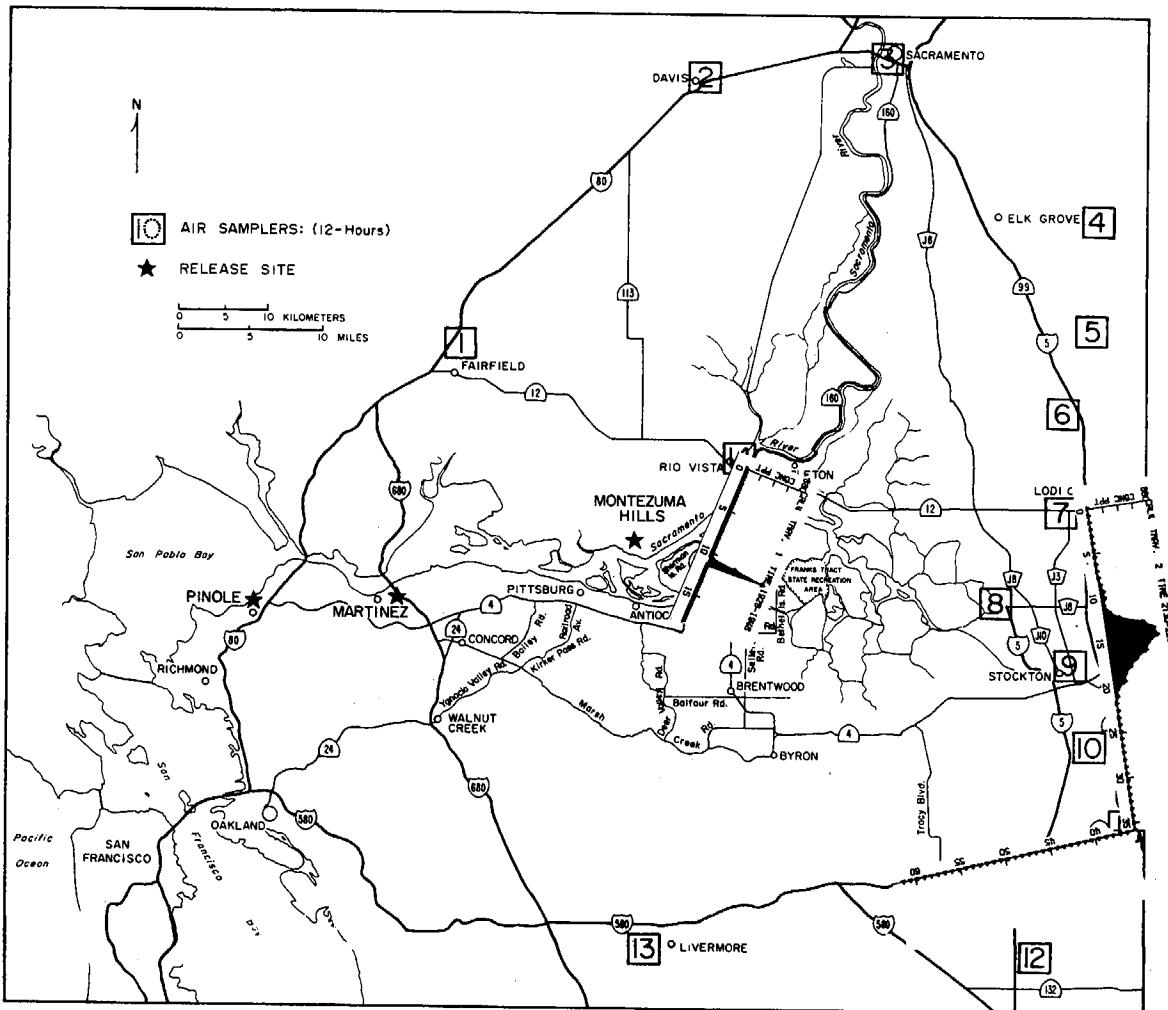


Figure 29.

TEST 4

9/6/76

## Auto Traverses:

1 1926 - 1946 PDT,  $SF_6$ (max) = 873 ppt.2 2130 - 2217 PDT,  $SF_6$ (max) = 746 ppt. $SF_6$  released from the Montezuma Hills from 1800-2300 PDT.

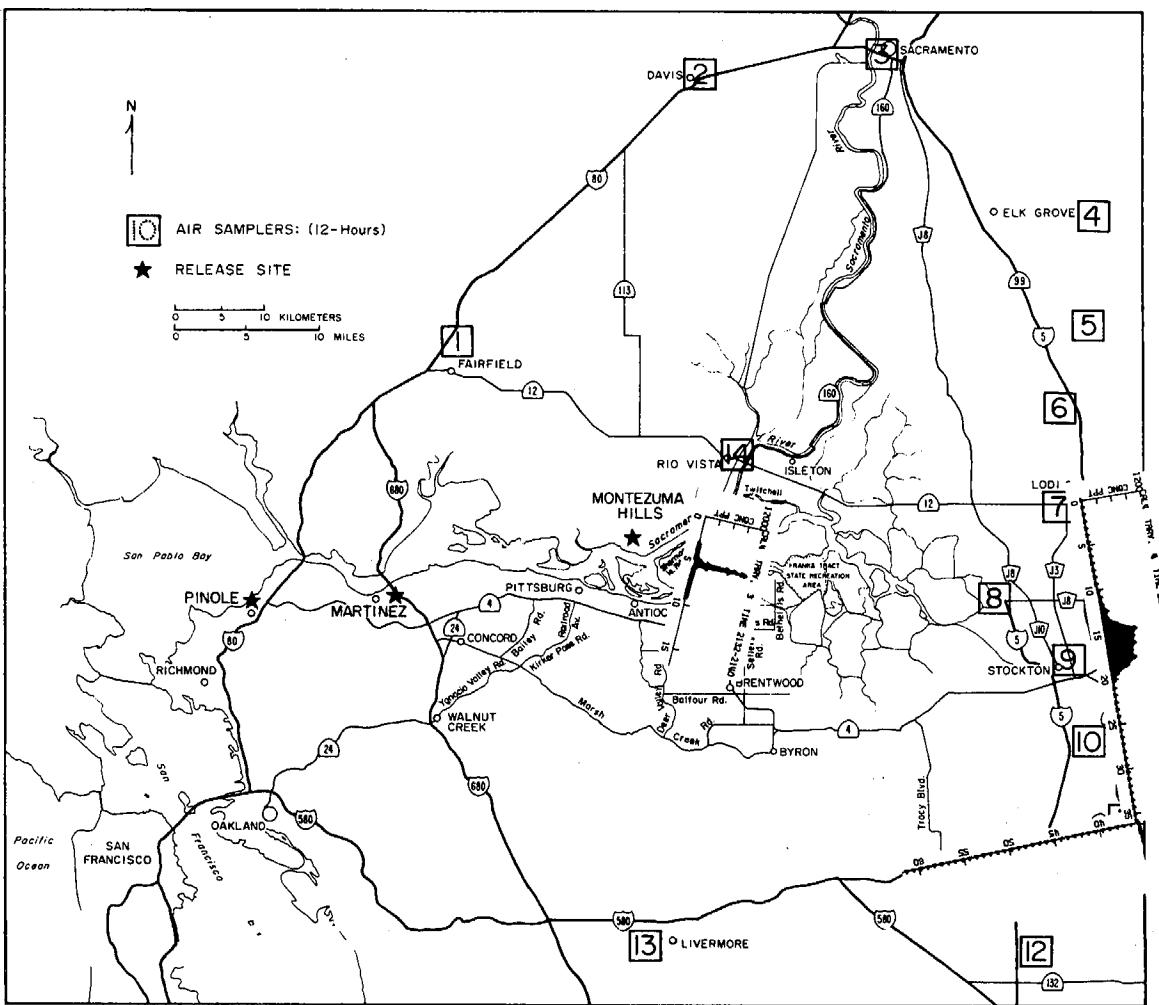


Figure 30.

TEST 4

9/6/76

## Auto Traverses:

3 2132 - 2140 PDT, SF<sub>6</sub>(max) = 10,570 ppt

4. 2200 - 2246 PDT, SF<sub>6</sub> (max) = 628 ppt

SF<sub>6</sub> released from the Montezuma Hills from 1800-2300 PDT.

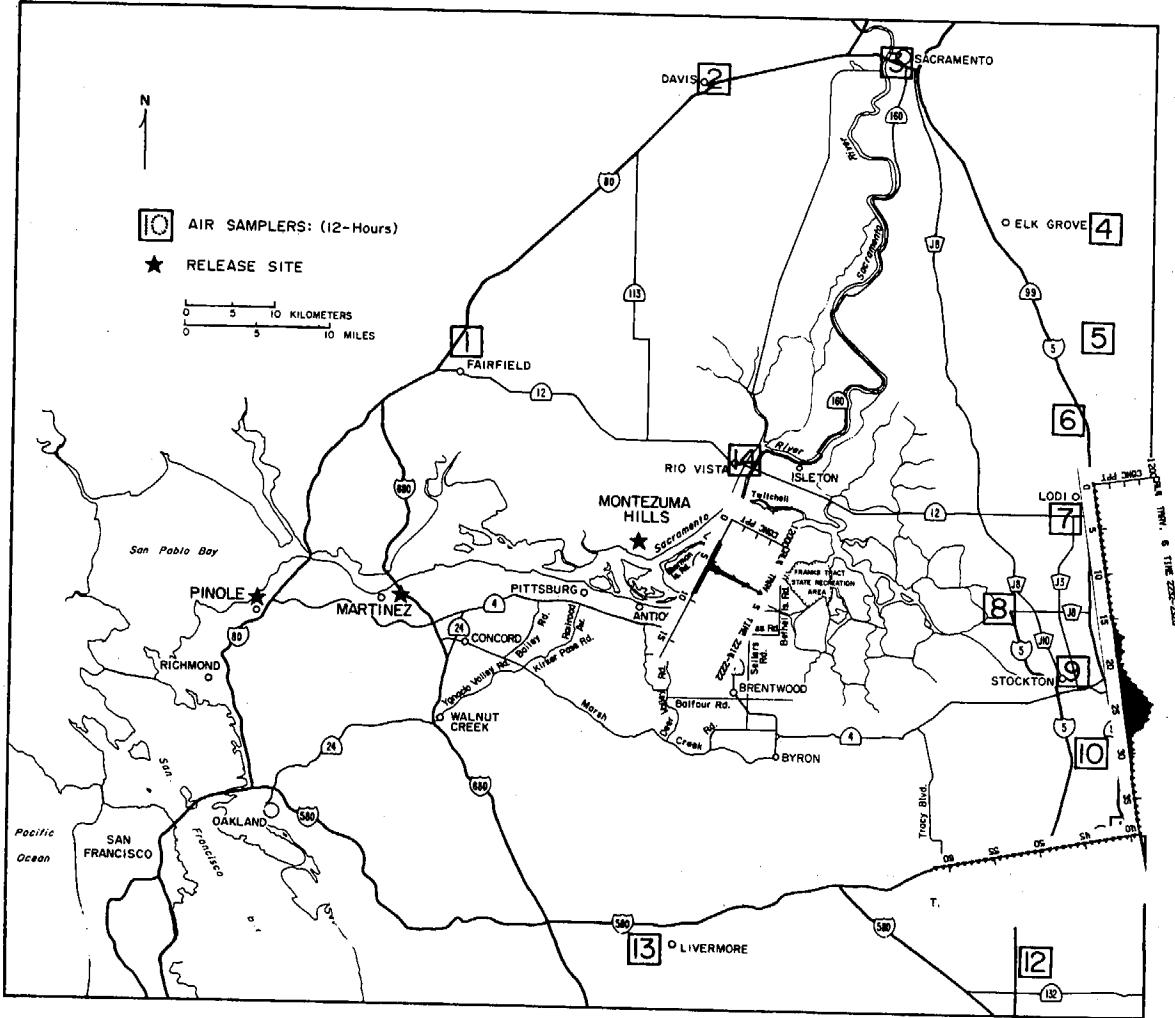


Figure 31.

## TEST 4

9/6/76

## Auto Traverses:

5 2214 - 2222 PDT, SF<sub>6</sub>(max) = 11,900 ppt6 2232 - 2320 PDT, SF<sub>6</sub>(max) = 553 pptSF<sub>6</sub> released from the Montezuma Hills from 1800-2300 PDT.

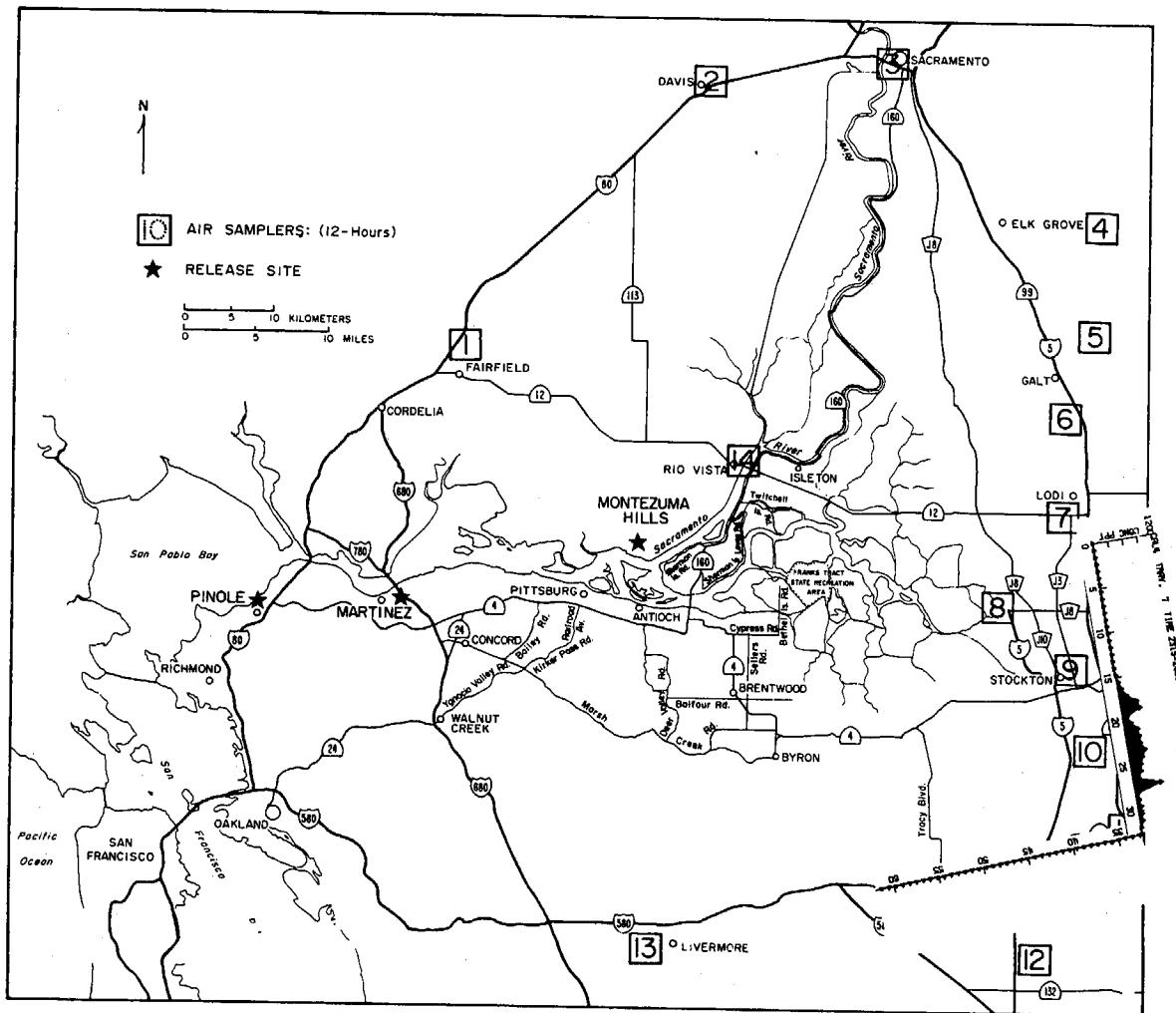


Figure 32.

TEST 4

9/6/76

Auto Traverse:

7 2315 - 2400 PDT, SF<sub>6</sub> (max) = 553 pptSF<sub>6</sub> released from the Montezuma Hills from 1800-2300 PDT.

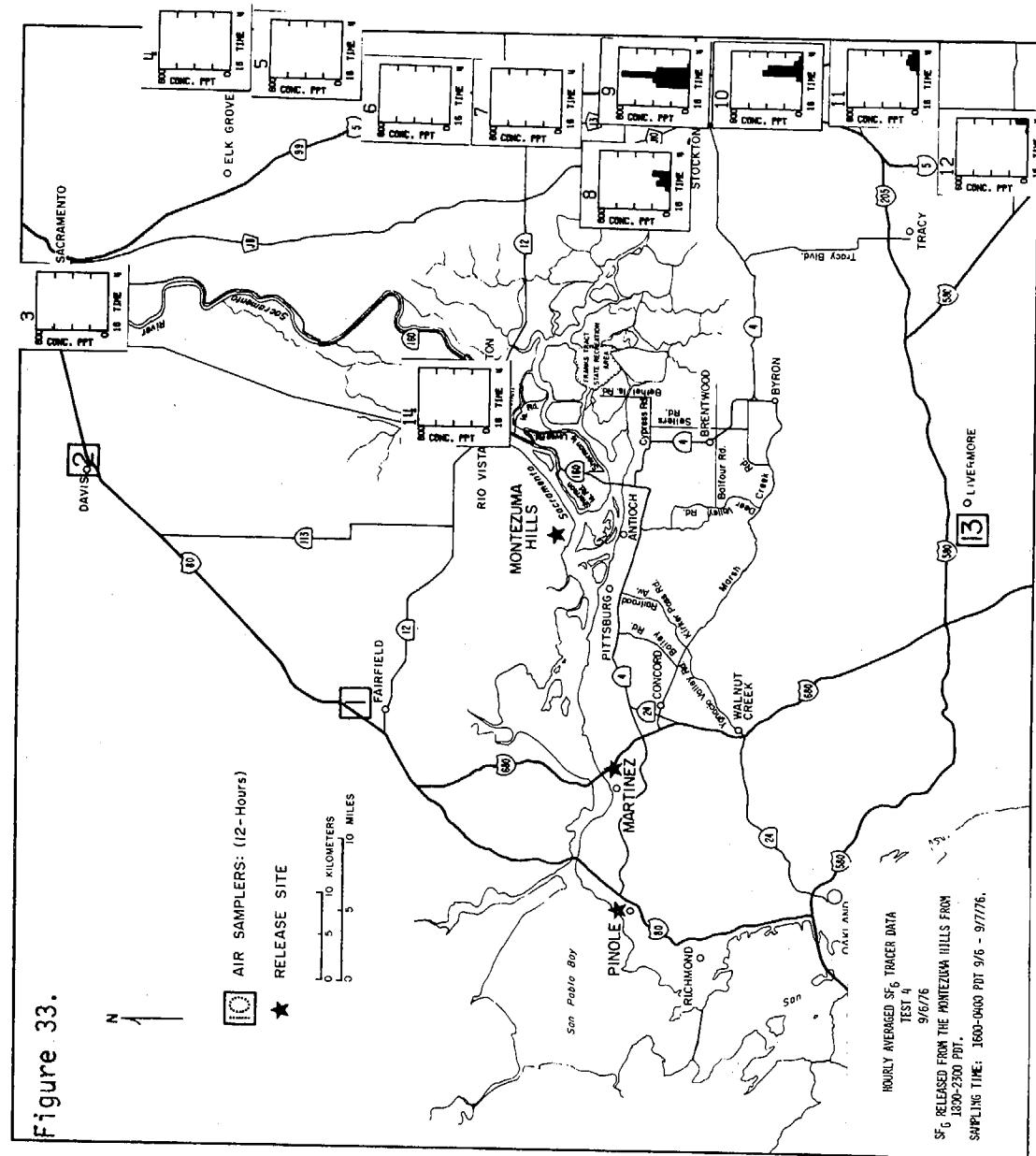
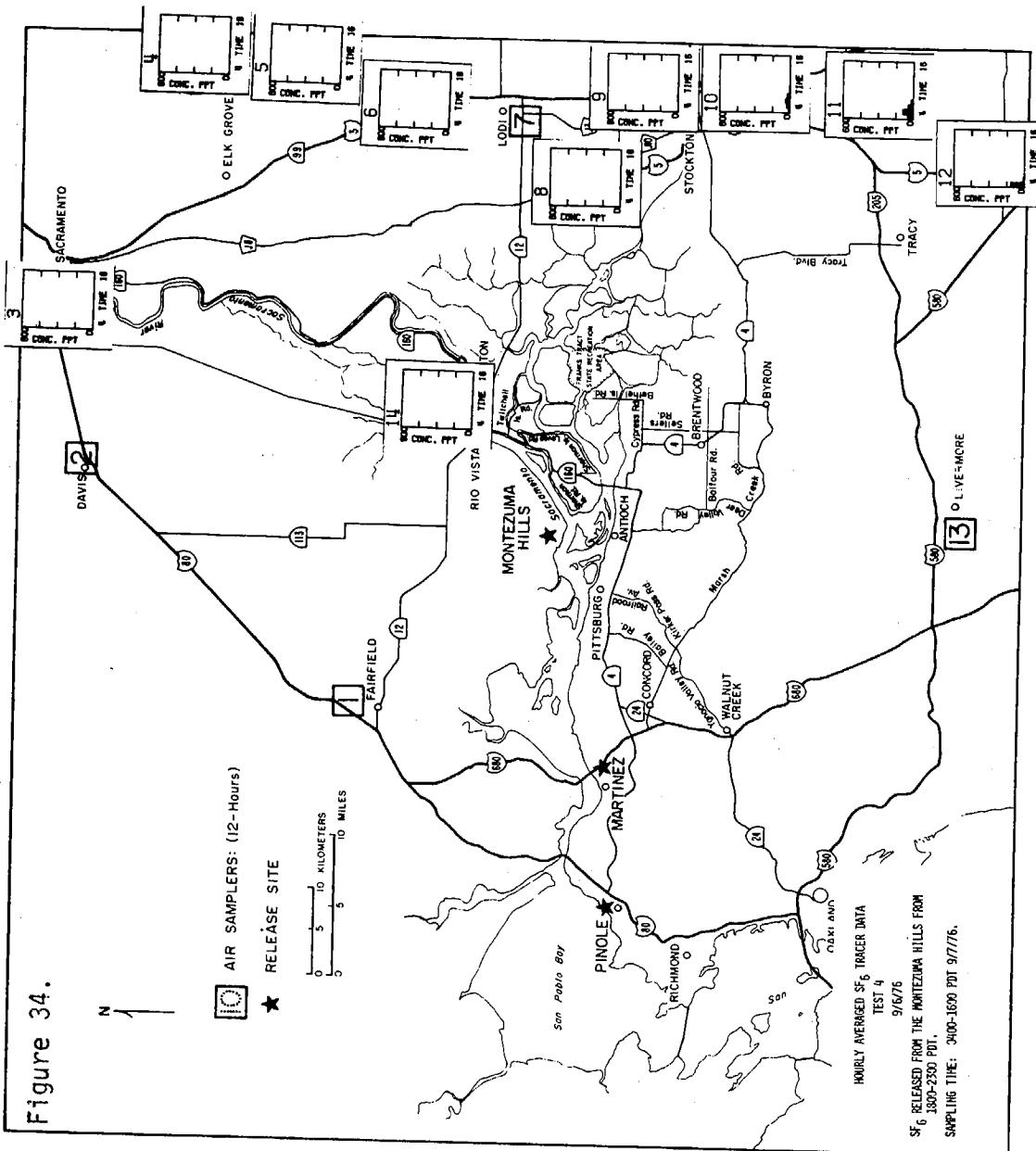


Figure 34.



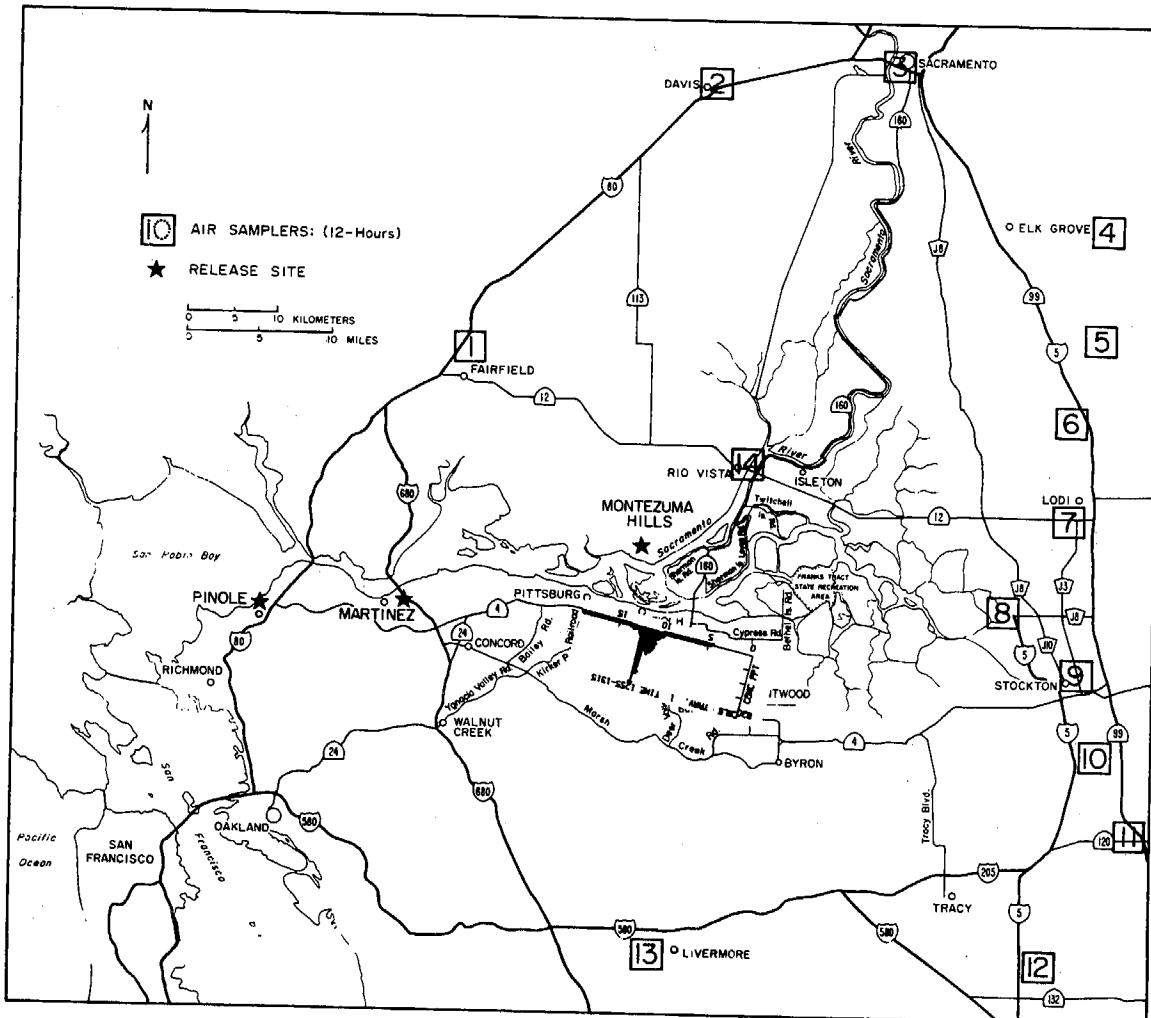


Figure 35.

## TEST 5

9/9/76

## Auto Traverse:

1 1255 - 1315 PDT, SF<sub>6</sub>(max) = 801 pptSF<sub>6</sub> released from the Montezuma Hills from 1130-1330 PDT.

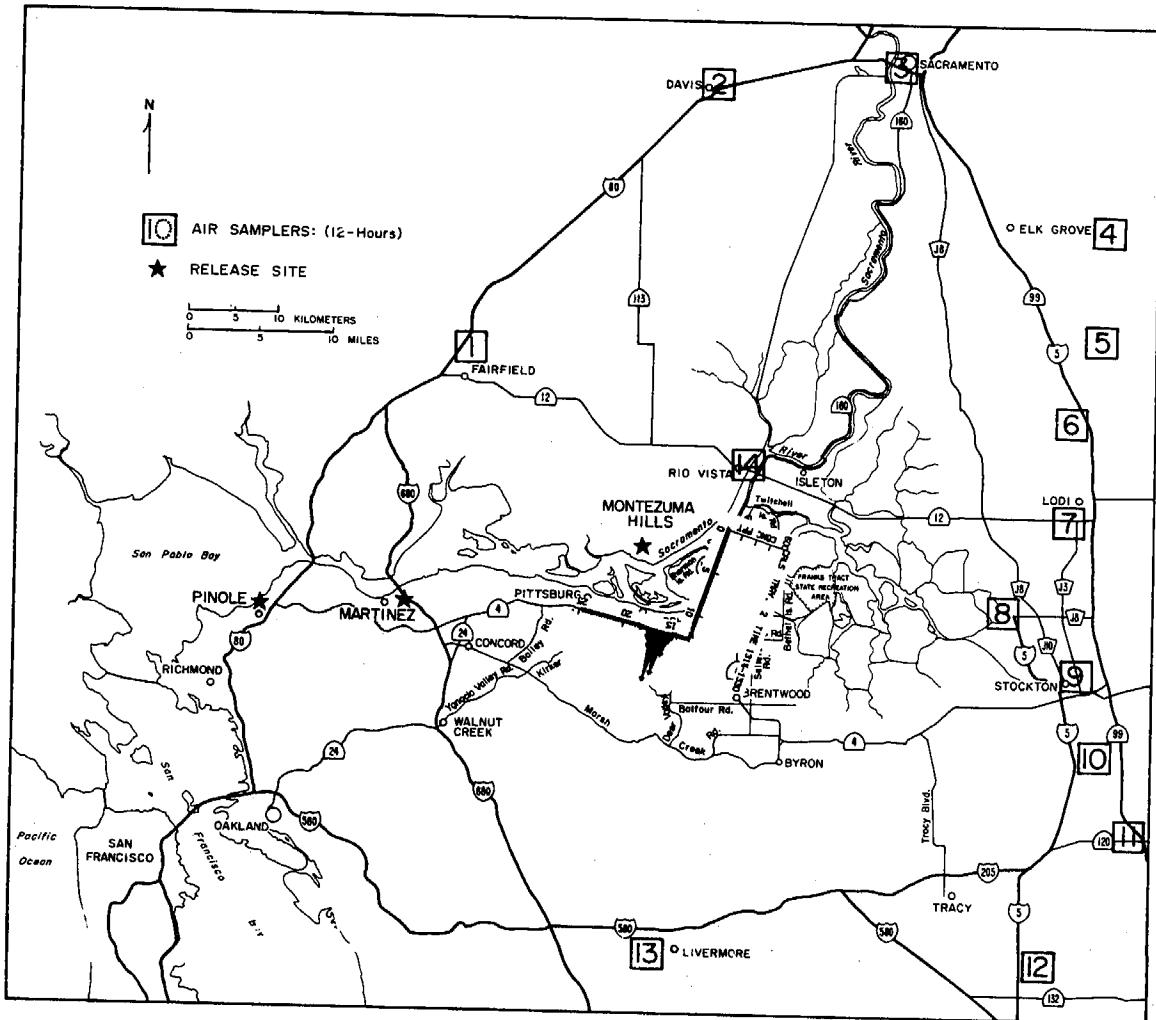


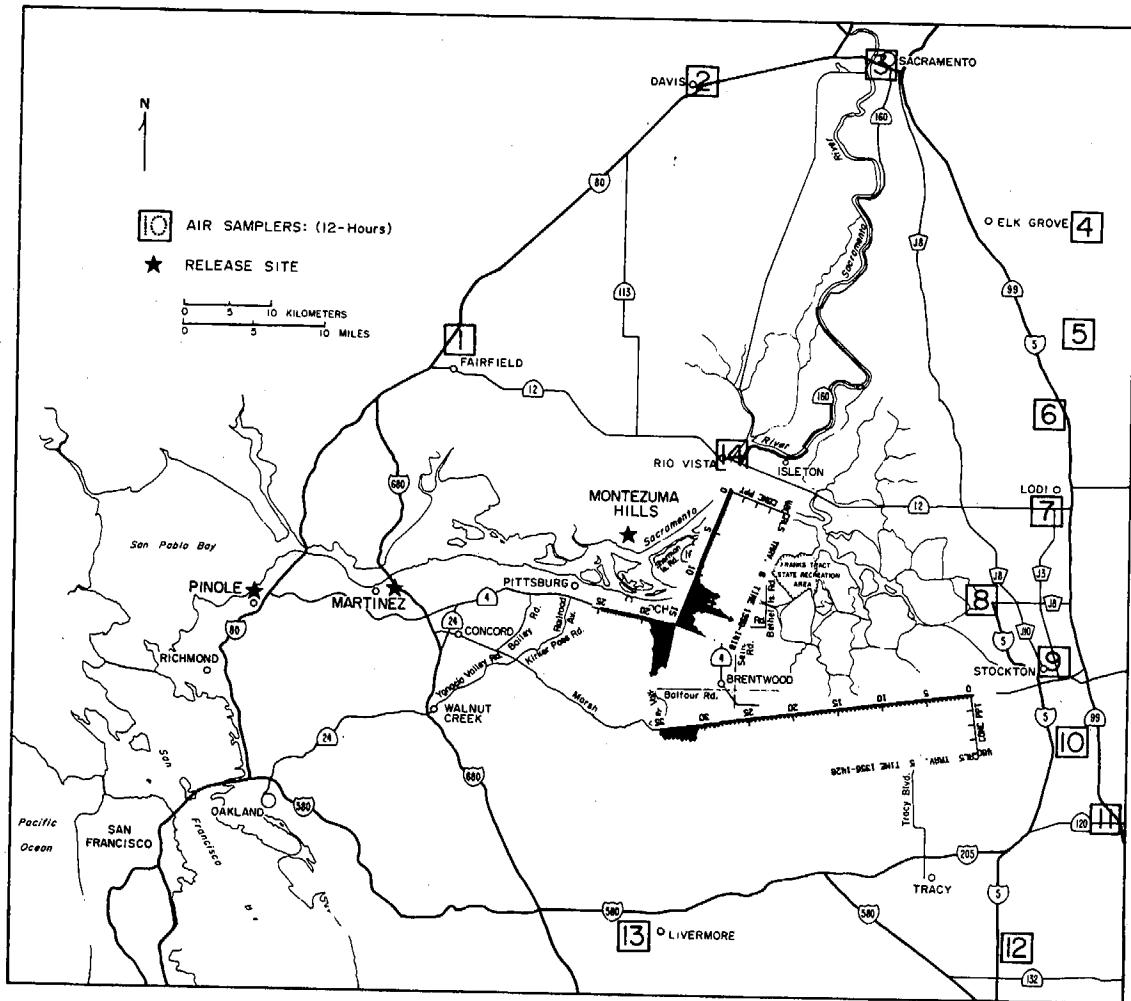
Figure 36.

TEST 5

9/9/76

Auto Traverse:

2 1314 - 1330 PDT, SF<sub>6</sub>(max) = 528 pptSF<sub>6</sub> released from the Montezuma Hills from 1130-1330 PDT.



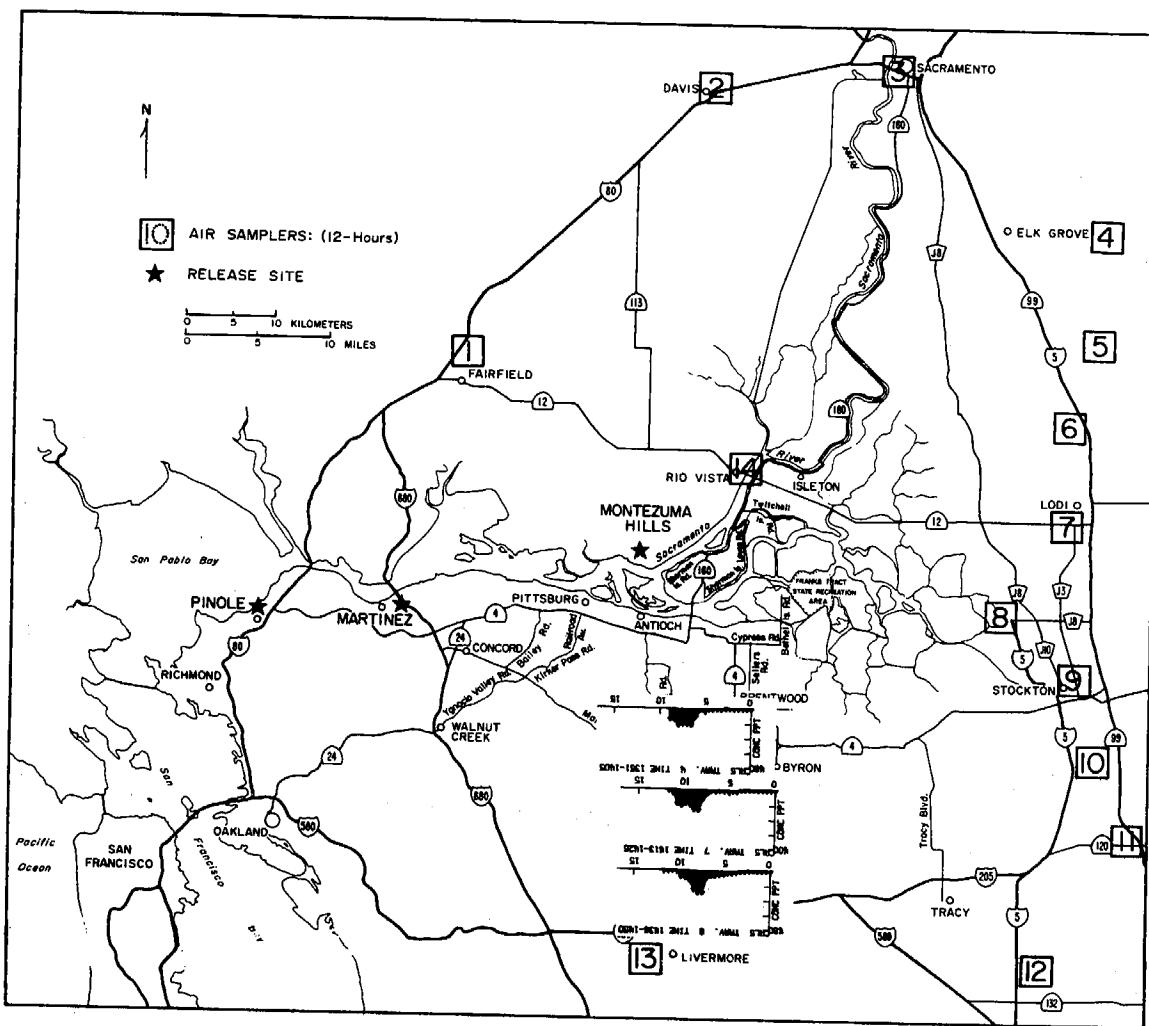


Figure 38.

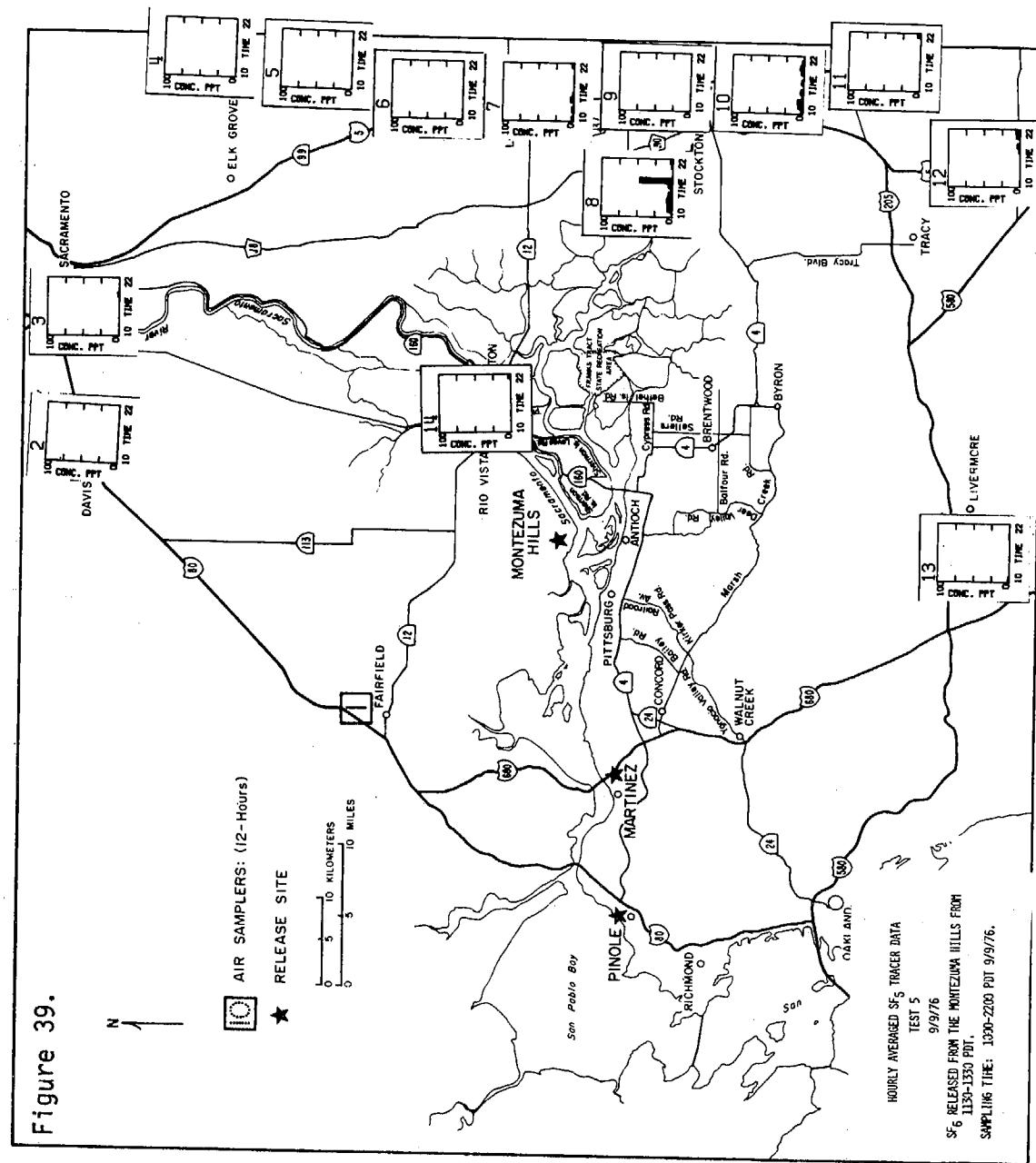
## TEST 5

9/9/76

## Auto Traverses:

- 4 1351 - 1405 PDT, SF<sub>6</sub>(max) = 138 ppt.  
 7 1413 - 1426 PDT, SF<sub>6</sub>(max) = 141 ppt.  
 8 1436 - 1450 PDT, SF<sub>6</sub>(max) = 183 ppt.

SF<sub>6</sub> released from the Montezuma Hills from 1130-1330 PDT.



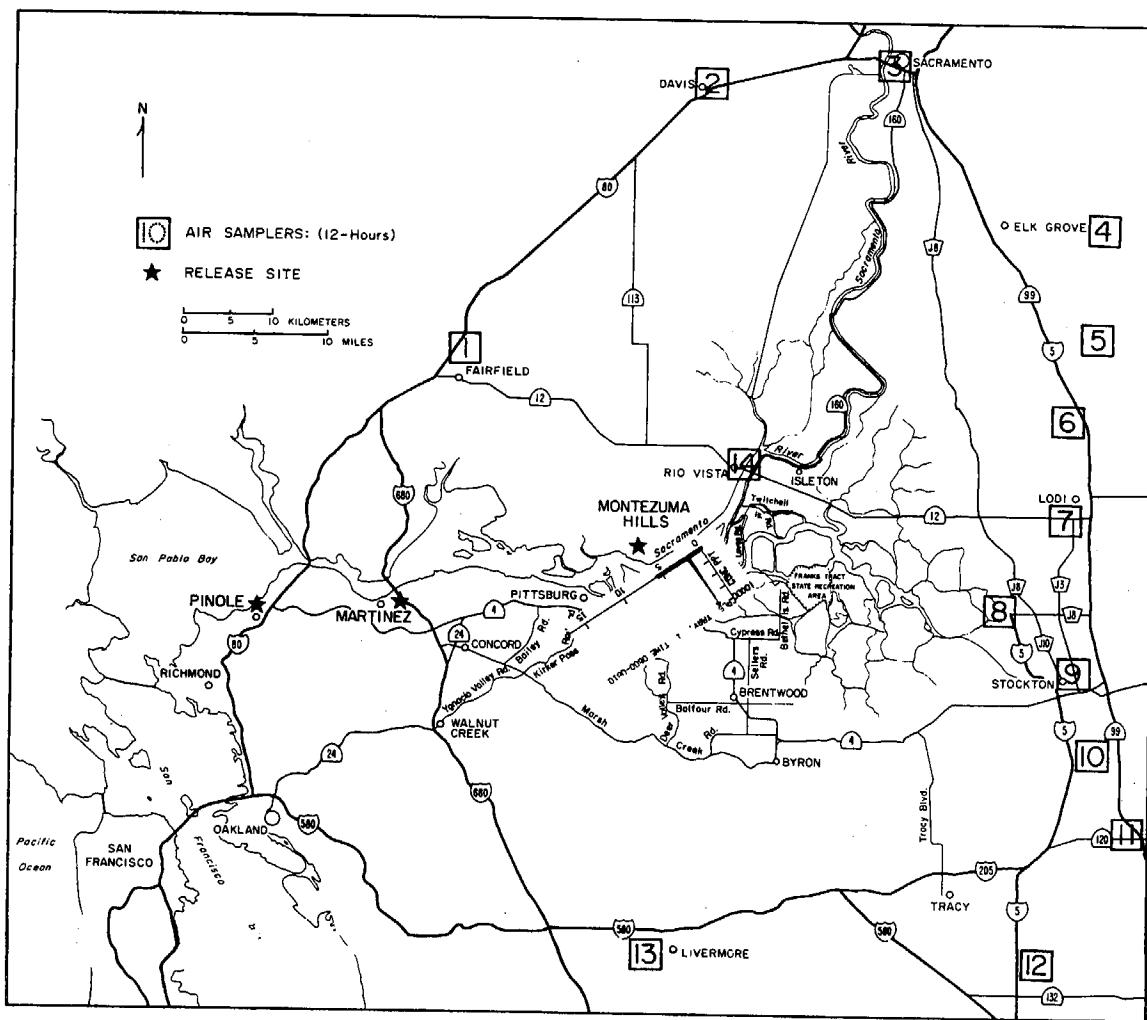


Figure 40.

## TEST 6

9/10/76

## Auto Traverse:

1 0800 - 0810 PDT, SF<sub>6</sub>(max) = 9526 ppt

SF<sub>6</sub> released from the Montezuma Hills from 0600-1100 PDT.

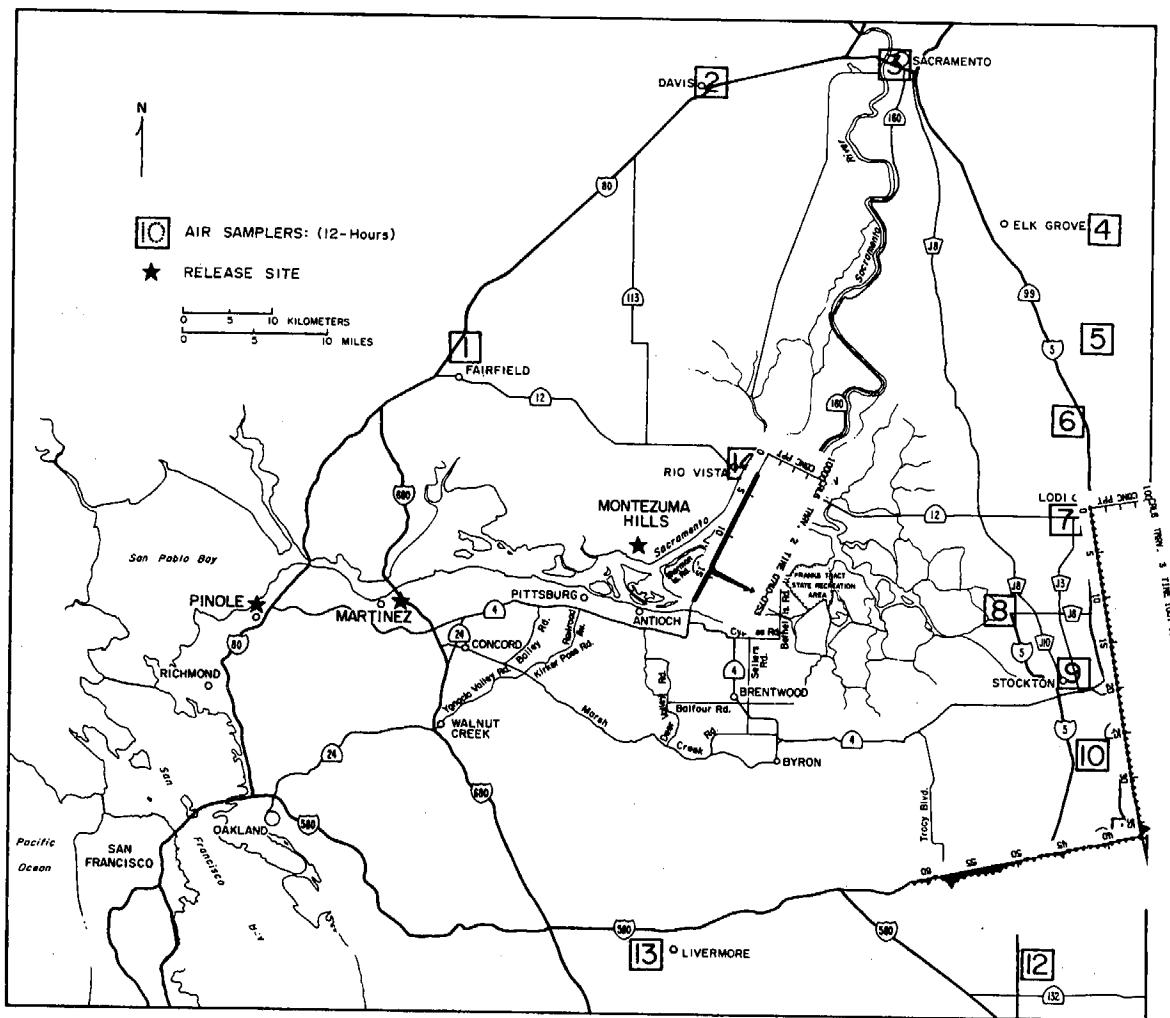


Figure 41.

TEST 6

9/10/76

## Auto Traverses:

2 0740 - 0753 PDT, SF<sub>6</sub>(max) = 7981 ppt

3 1001 - 1051 PDT, SF<sub>6</sub>(max) = 20 ppt

SF<sub>6</sub> released from the Montezuma Hills from 0600-1100 PDT.

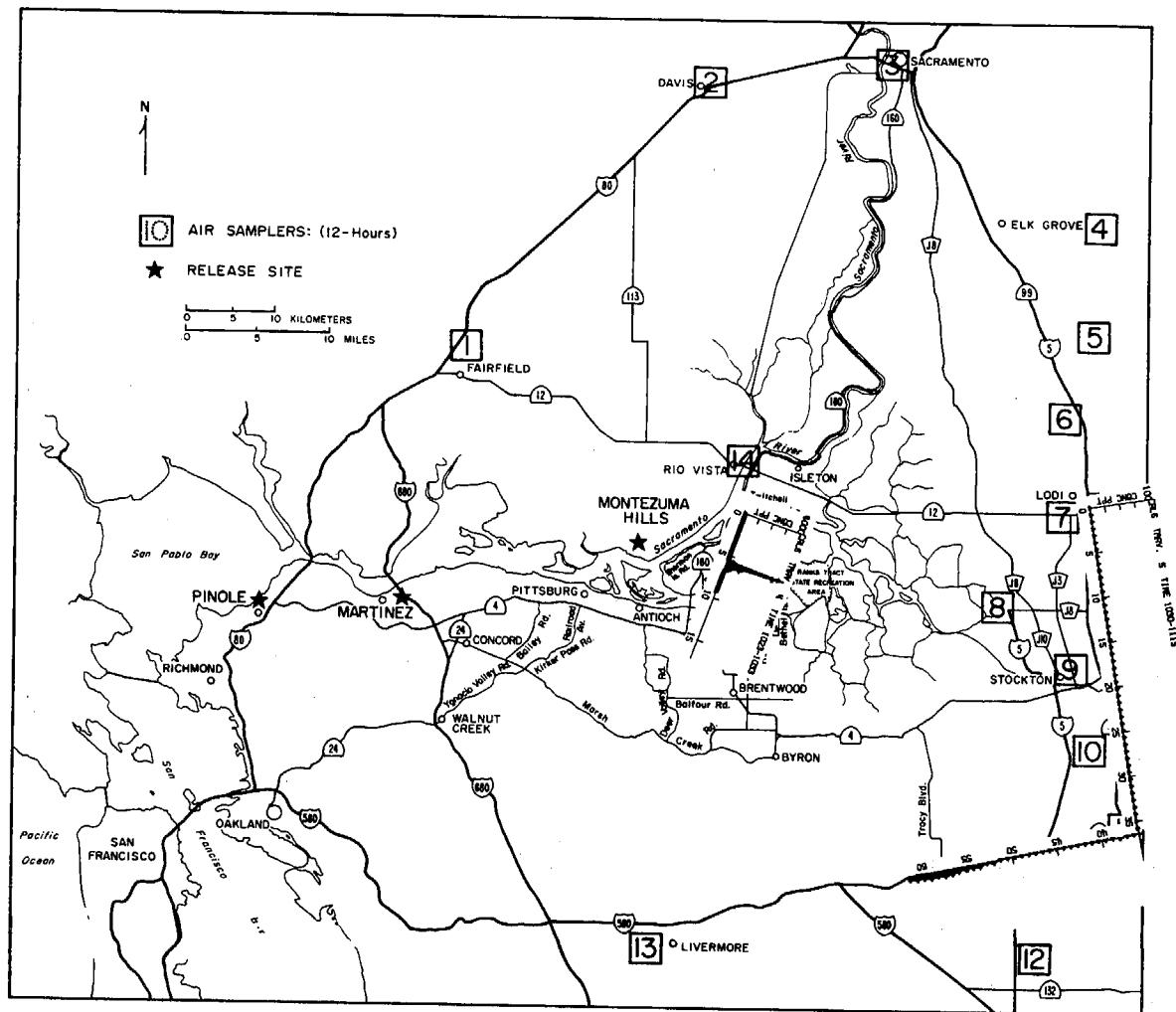


Figure 42.

TEST 6

9/10/76

## Auto Traverses;

4 1023 - 1033 PDT,  $SF_6$  (max) = 3739 ppt5 1030 - 1115 PDT,  $SF_6$  (max) = 11 ppt $SF_6$  released from the Montezuma Hills from 0600-1100 PDT.

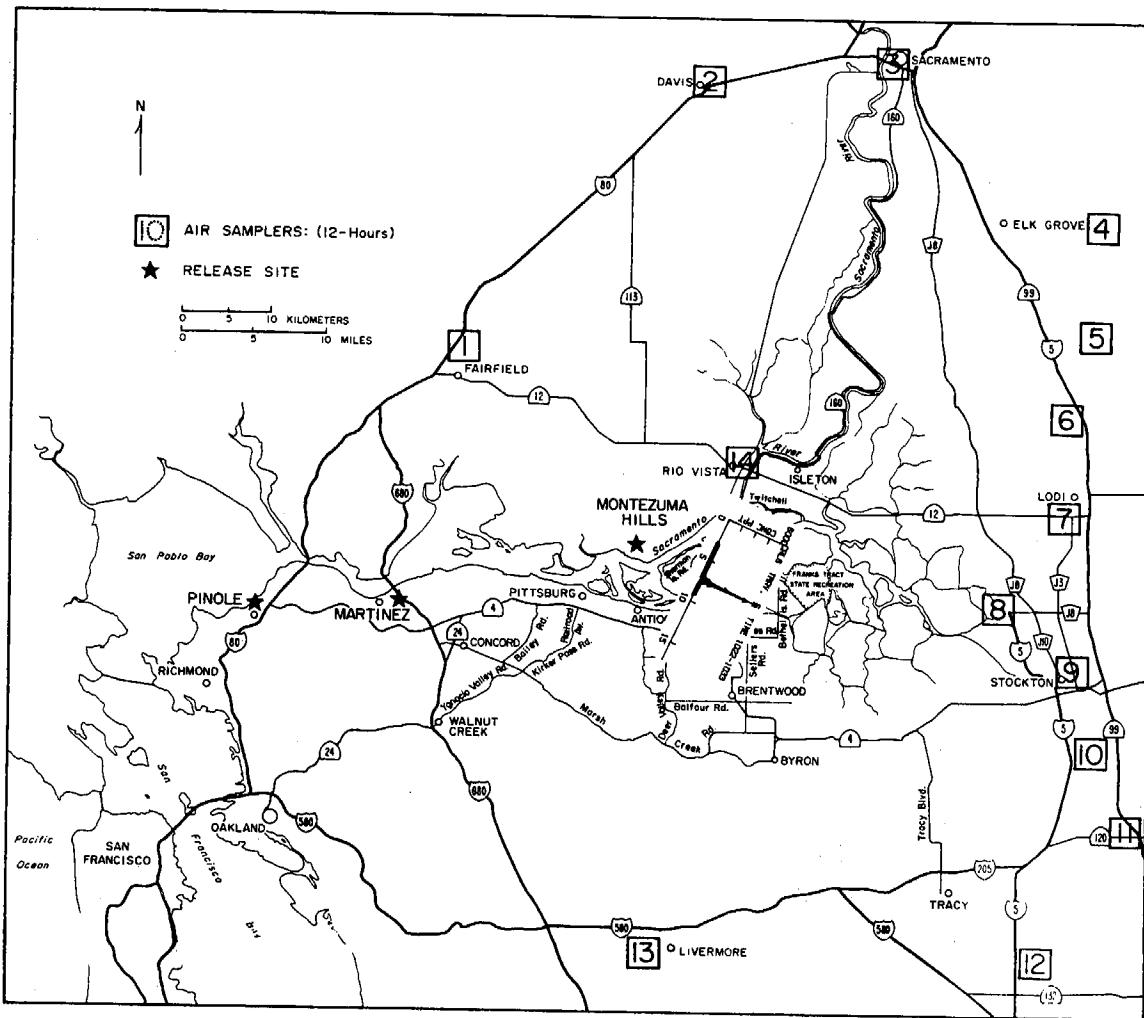


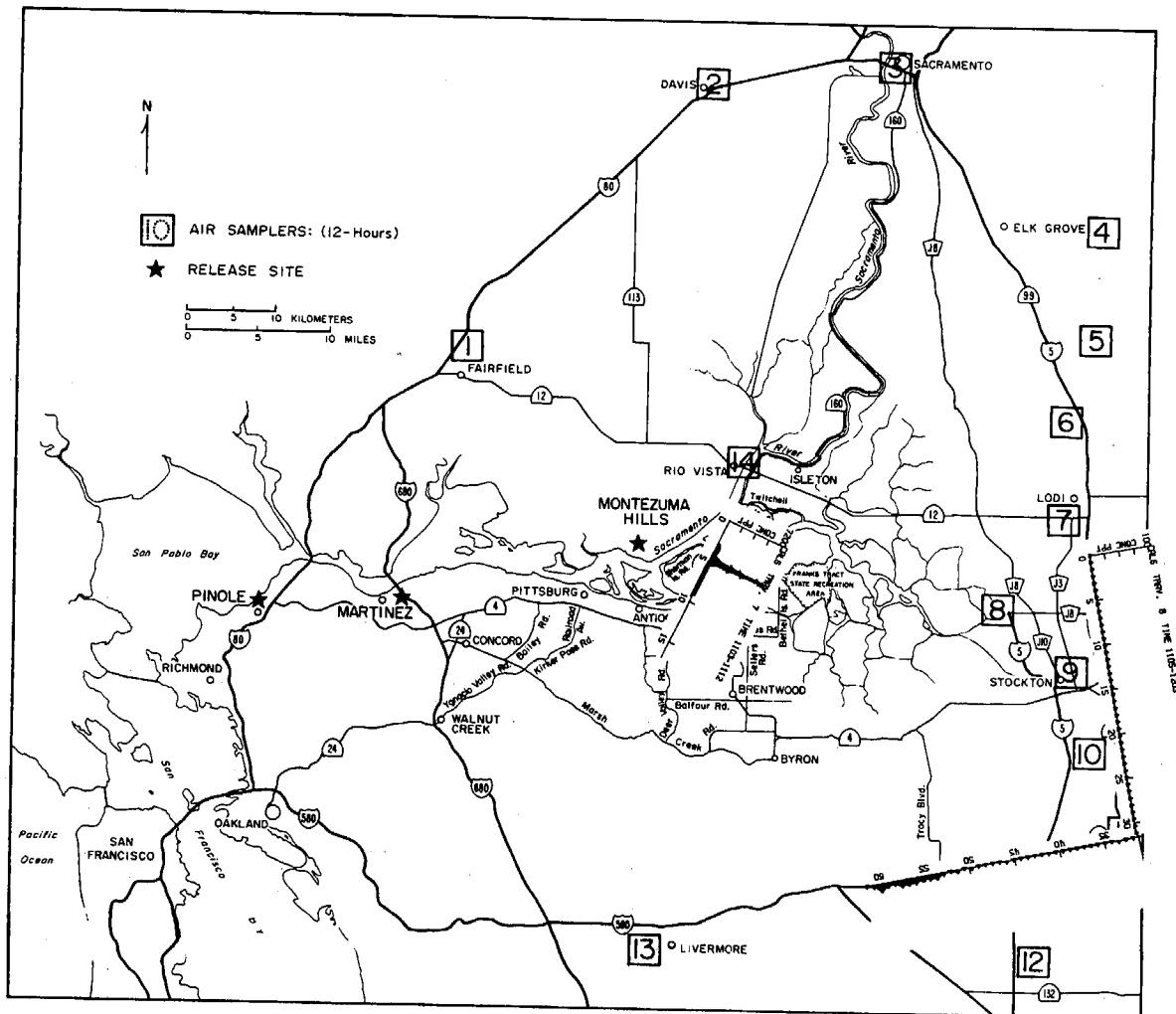
Figure 43.

TEST 6

9/10/76

Auto Traverse:

6 1022 - 1033 PDT, SF<sub>6</sub>(max) = 5954 pptSF<sub>6</sub> released from the Montezuma Hills from 0600-1100 PDT.



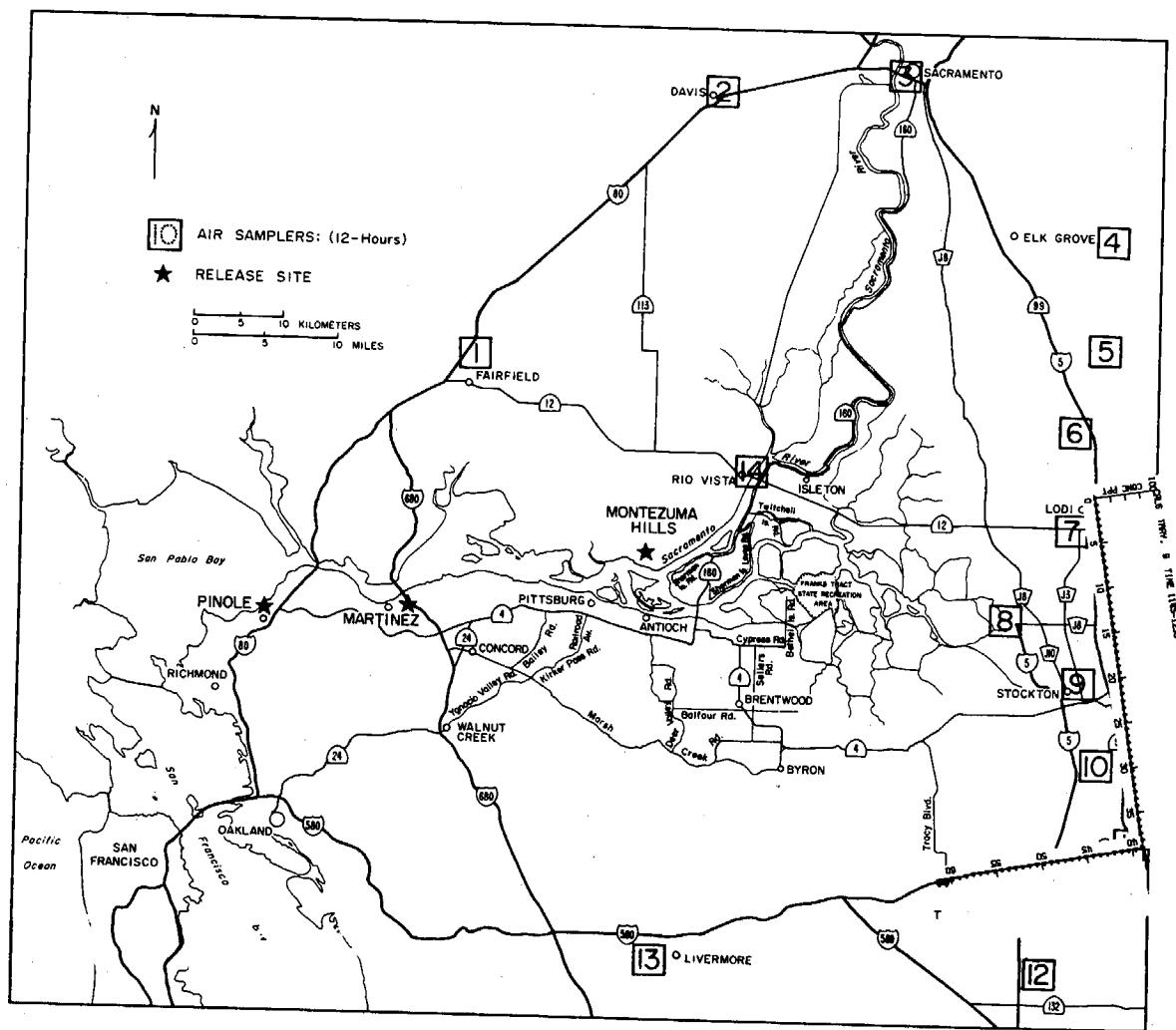


Figure 45.

## TEST 6

9/10/76

## Auto Traverse:

9 1145 - 1230 PDT, SF<sub>6</sub>(max) = 10 pptSF<sub>6</sub> released from the Montezuma Hills from 0600-1100 PDT.

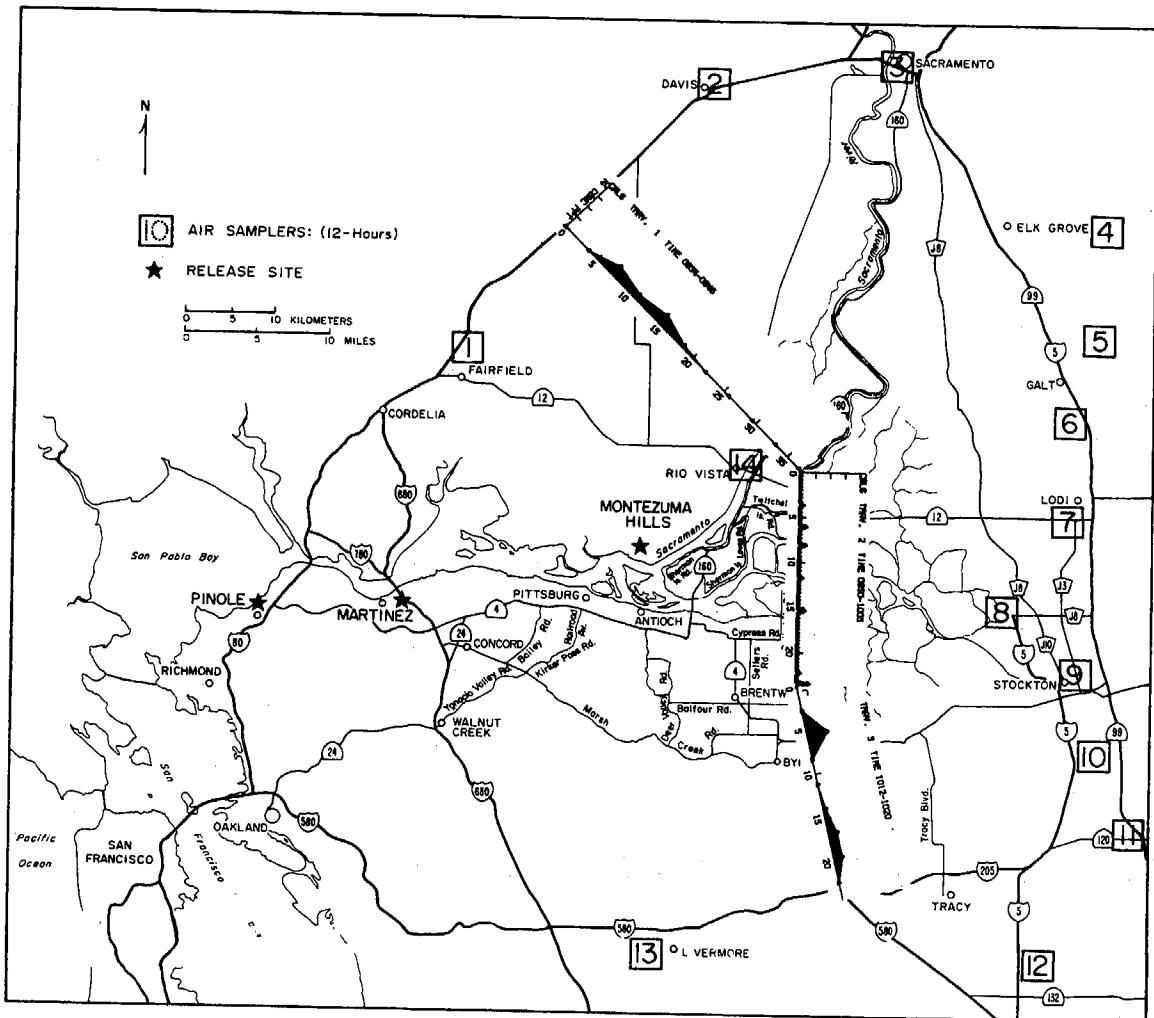


Figure 46.

## TEST 6

9/10/76

## Airborne Traverses:

- 1 0934 - 0946 PDT, 305 m, SF<sub>6</sub> (max) = 4 ppt
- 2 0950 - 1005 PDT, 305 m, SF<sub>6</sub> (max) = 4 ppt
- 3 1012 - 1020 PDT, 305 m, SF<sub>6</sub> (max) = 7 ppt

SF<sub>6</sub> released from the Montezuma Hills from 0600-1100 PDT.

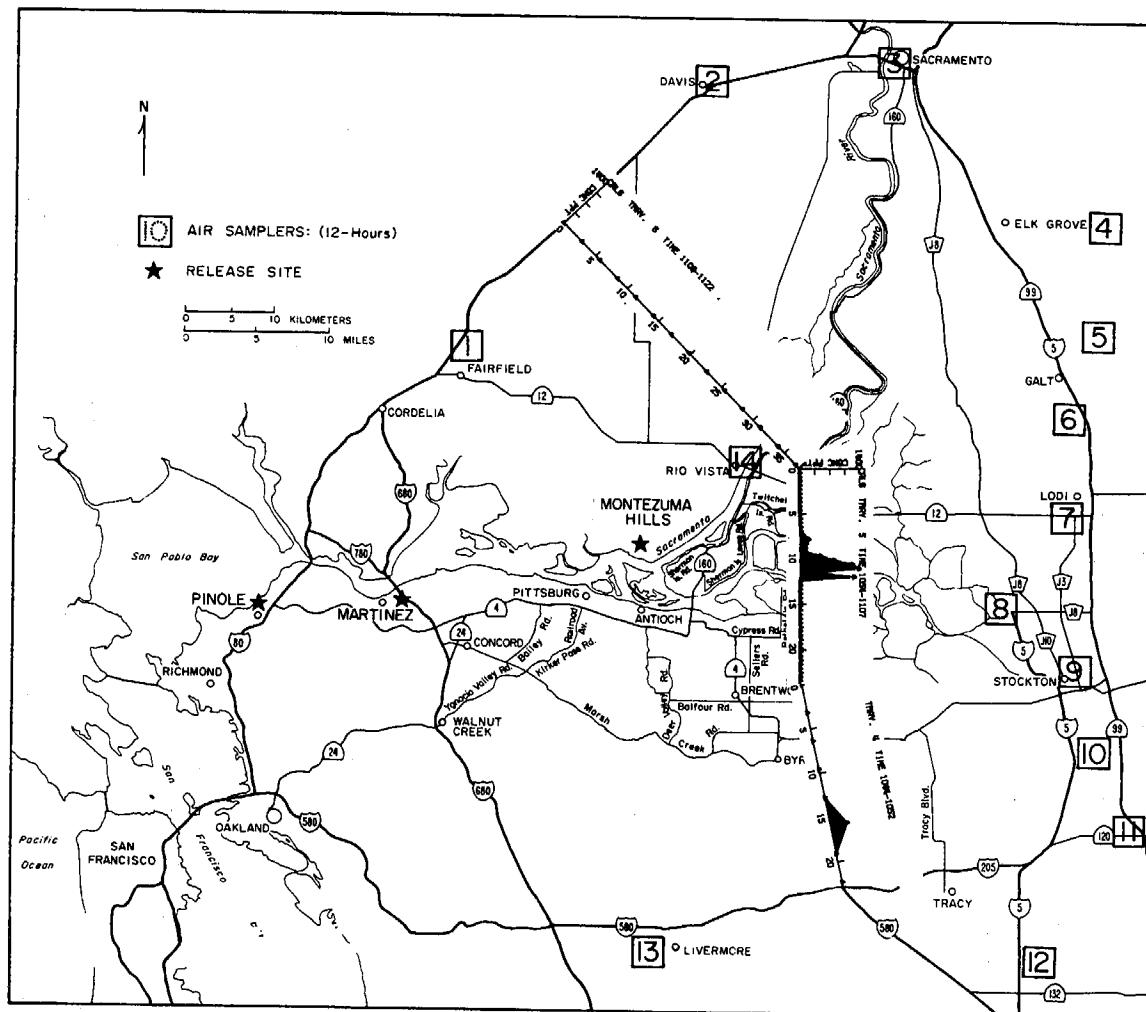


Figure 47.

TEST 6

9/10/76

## Airborne Traverses:

4 1044 - 1052 PDT, 183 m, SF<sub>6</sub>(max) = 396 ppt

5 1054 - 1107 PDT, 183 m, SF<sub>6</sub>(max) = 1387 ppt

6 1109 - 1122 PDT, 183 m, SF<sub>6</sub>(max) = 0 ppt

SF<sub>6</sub> released from the Montezuma Hills from 0600-1100 PDT.

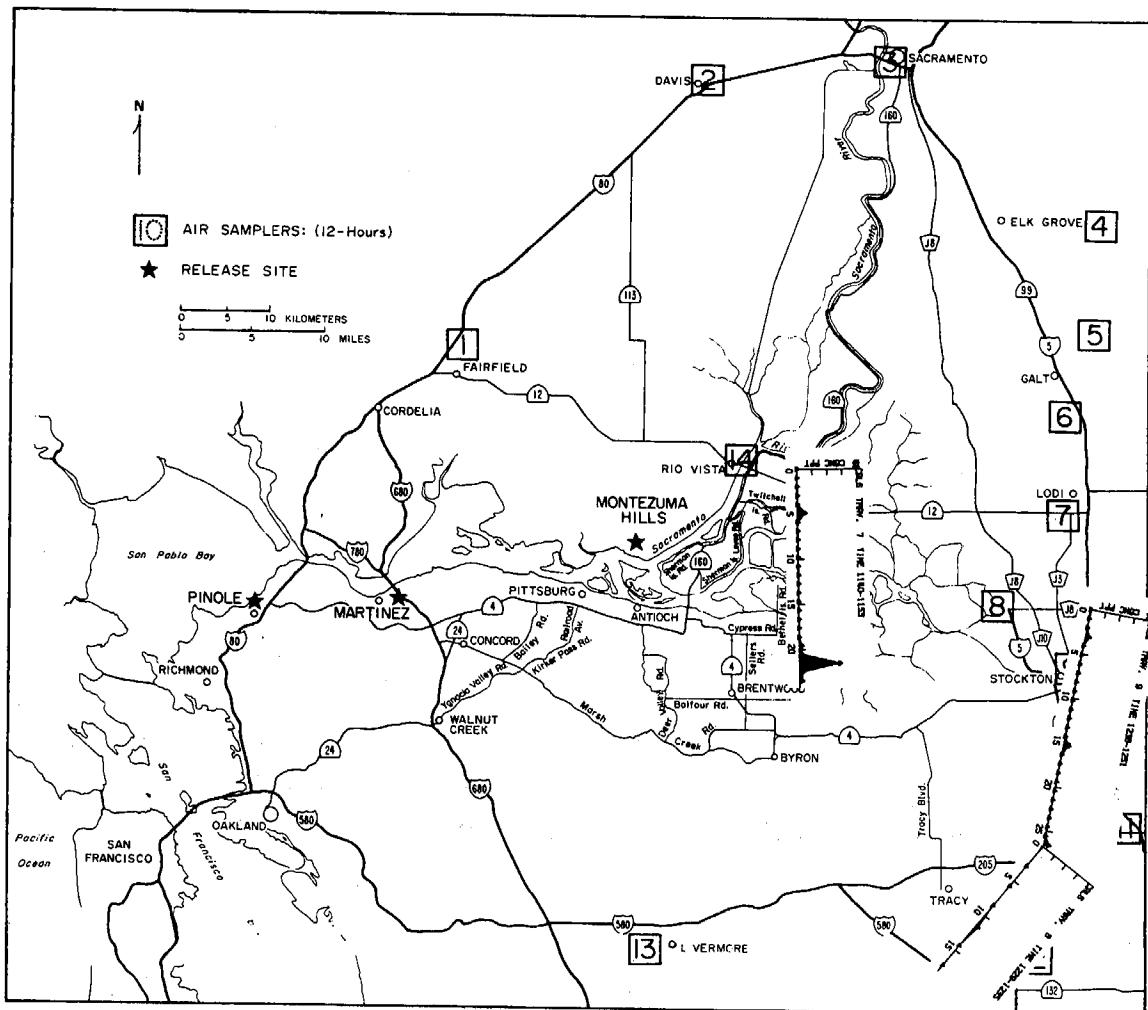


Figure 48.

## TEST 6

9/10/76

## Airborne Traverses:

- 7 1140 - 1153 PDT, 427 m, SF<sub>6</sub> (max) = 33 ppt
- 8 1229 - 1235 PDT, 305 m, SF<sub>6</sub> (max) = 2 ppt
- 9 1238 - 1251 PDT, 305 m, SF<sub>6</sub> (max) = 4 ppt

SF<sub>6</sub> released from the Montezuma Hills from 0600-1100 PDT.

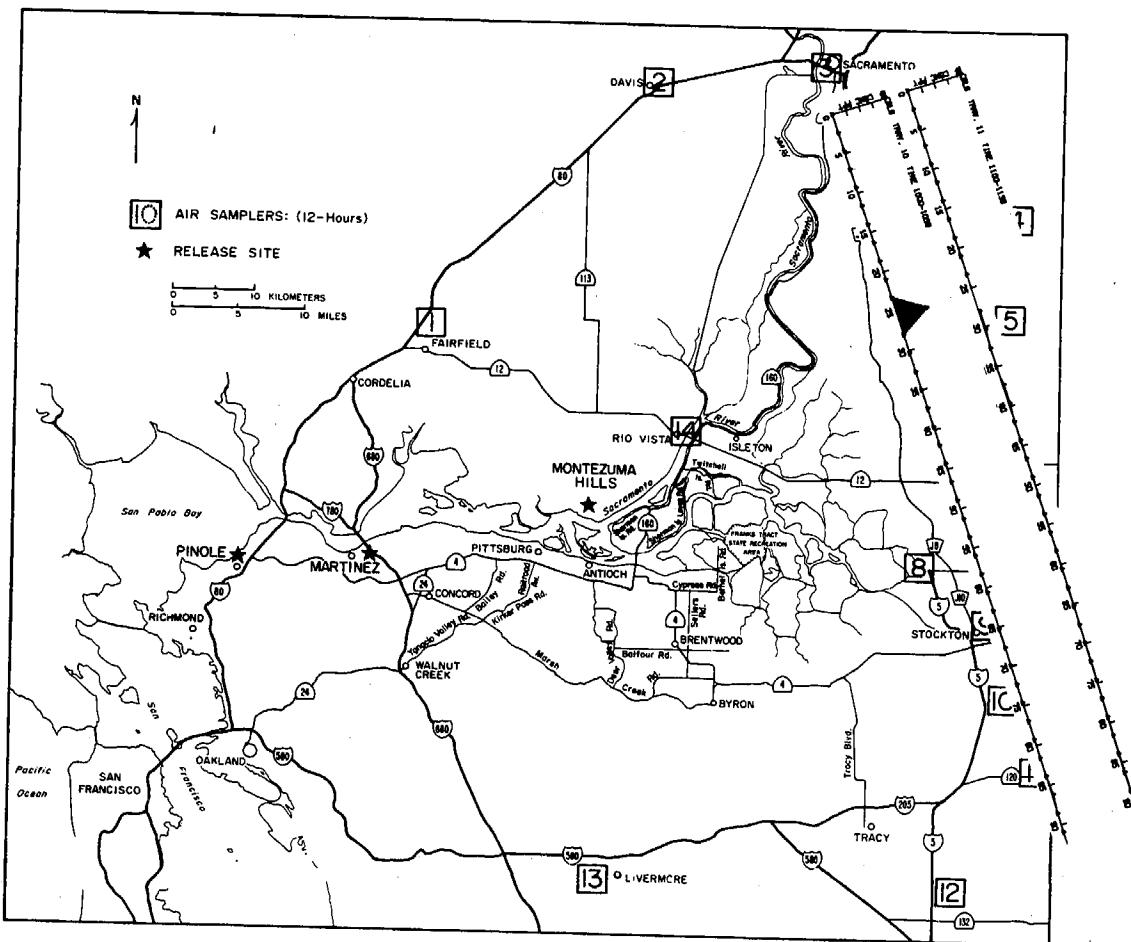


Figure 49.

## TEST 6

9/10/76

### Airborne Traverses:

10 1000 - 1039 PDT, 183 m, SF<sub>6</sub>(max) = 27 ppt

11 1100 - 1139 PDT, 183 m, SF<sub>6</sub>(max) = 1 ppt

SF<sub>6</sub> released from the Montezuma Hills from 0600-1100 PDT.

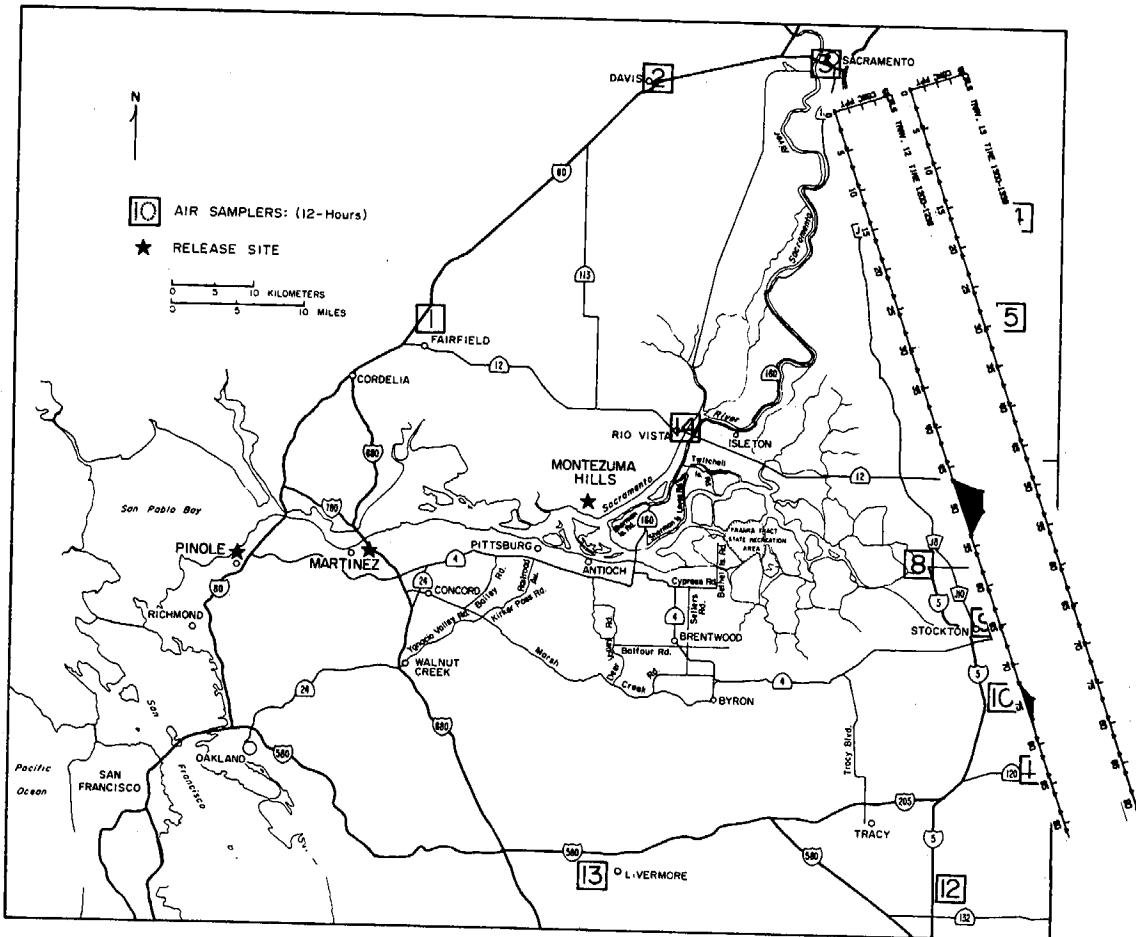


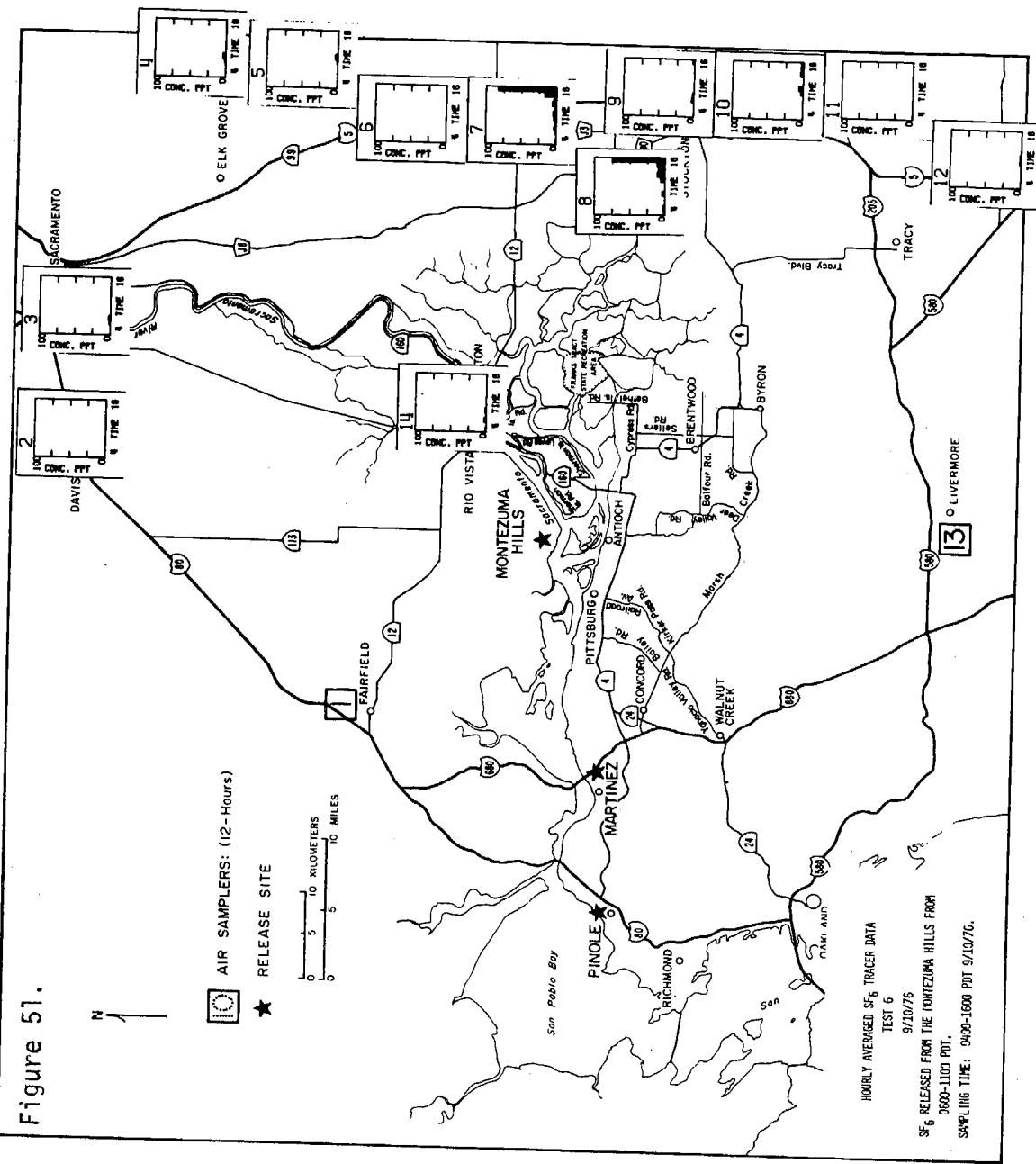
Figure 50.

## TEST 6

9/10/76

## Airborne Traverses:

12 1200 - 1239 PDT, 183 m, SF<sub>6</sub>(max) = 21 ppt13 1300 - 1339 PDT, 183 m, SF<sub>6</sub>(max) = 0 pptSF<sub>6</sub> released from the Montezuma Hills from 0600-1100 PDT.



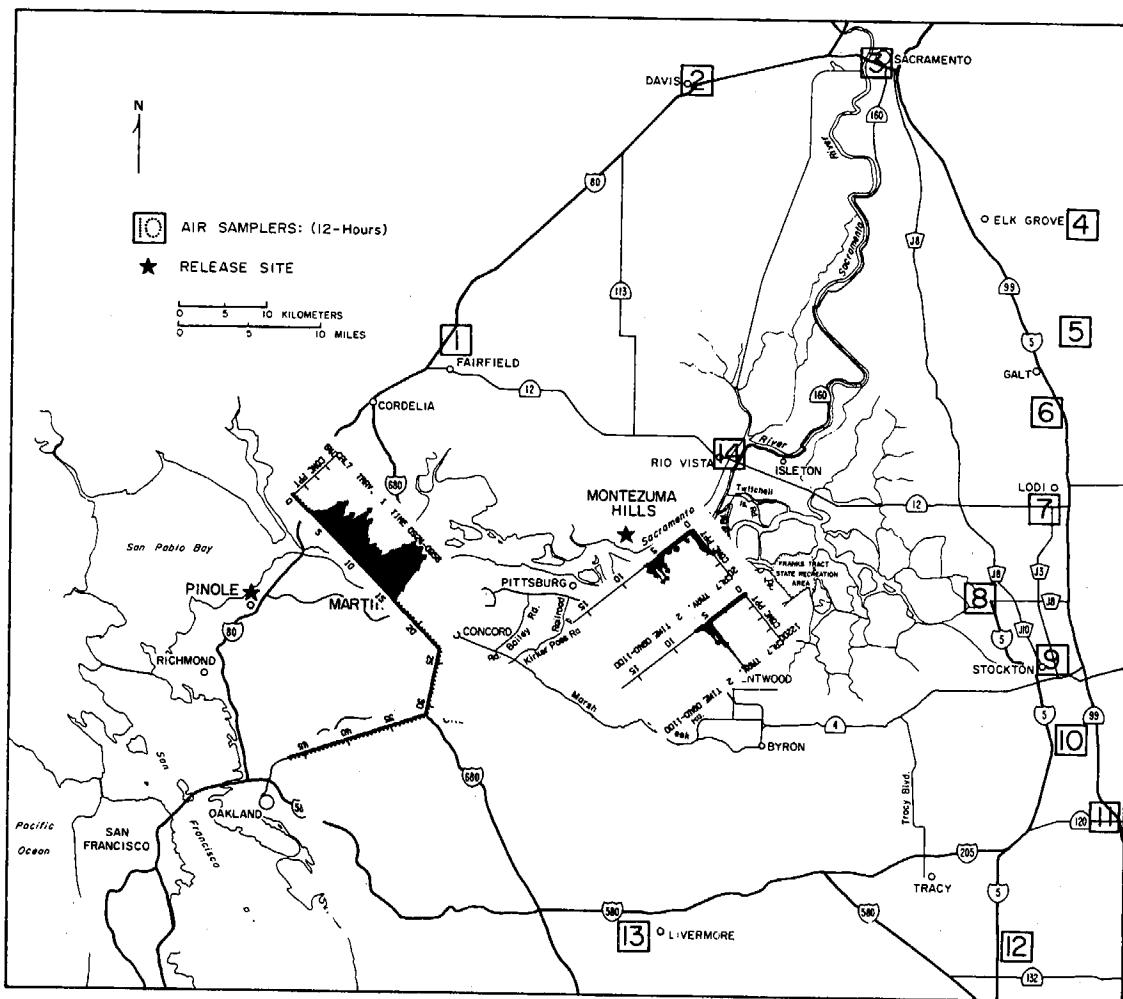


Figure 52.

TEST 7

9/13/76

## Auto Traverses:

- 1 0924-0925 PDT,  $SF_6$  (max) = 614 ppt.
- 2 0940-1100 PDT,  $SF_6$  (max) = 11 ppt.  
0940-1100 PDT,  $CBrF_3$  (max) = 12,140 ppt.

$SF_6$  released from Pinole from 0600-1500 PDT.

$CBrF_3$  released from the Montezuma Hills from 0900-1100 PDT,  
and from 1300-1400 PDT.

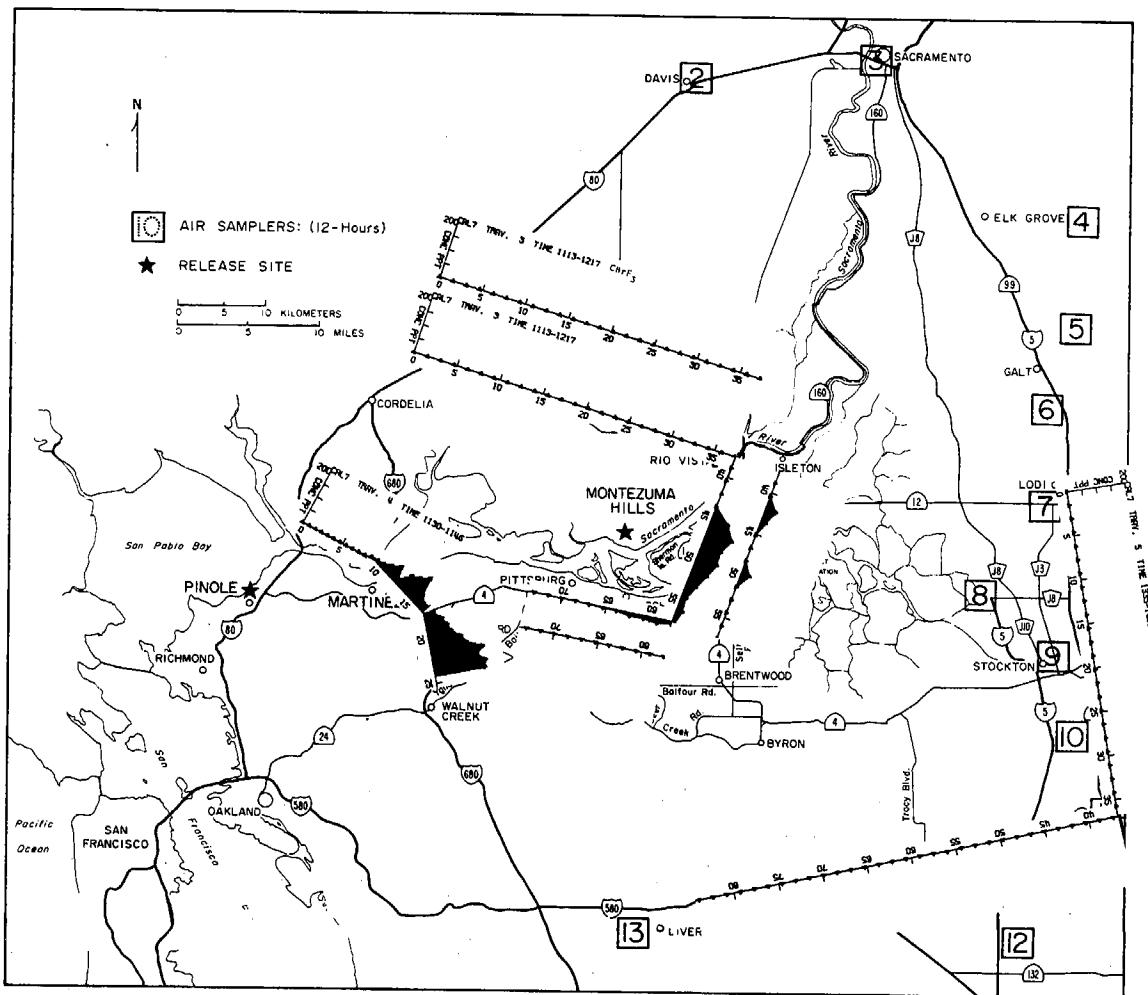


Figure 53.

TEST 7

9/13/76

## Auto Traverses:

3 1113-1217 PDT, SF<sub>6</sub>(max) = 94 ppt.1113-1217 PDT, CBrF<sub>3</sub>(max) = 37 ppt.4 1130-1146 PDT, SF<sub>6</sub>(max) = 180 ppt.5 1335-1458 PDT, SF<sub>6</sub>(max) = 3 ppt.SF<sub>6</sub> released from Pinole from 0600-1500 PDT.CBrF<sub>3</sub> released from the Montezuma Hills from 0900-1100 PDT  
and from 1300-1400 PDT.

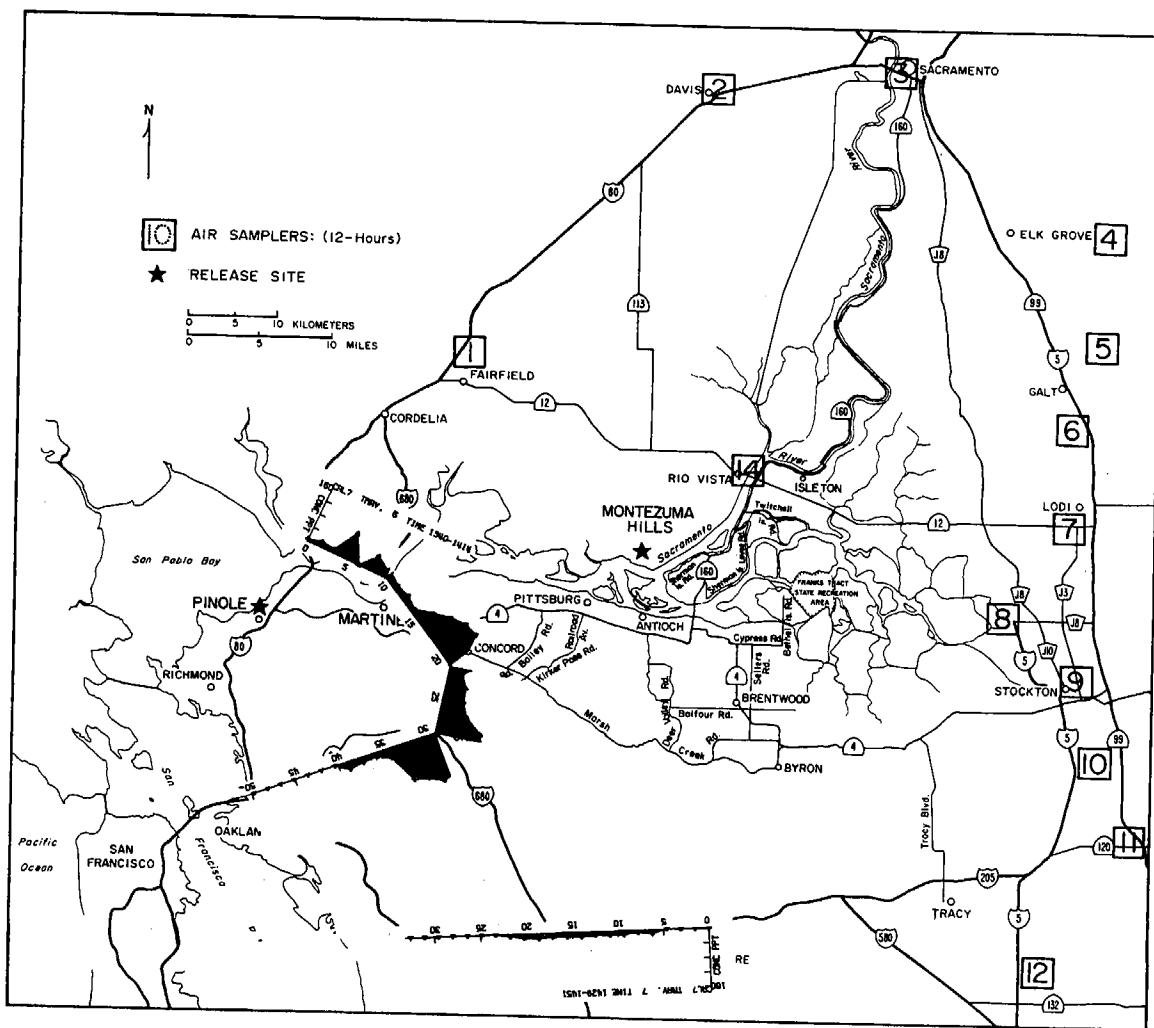


Figure 54.

TEST 7

9/13/76

## Auto Traverse:

$$6 \text{ } 1340 - 1414 \text{ PDT, } SF_6(\text{max}) = 131 \text{ ppt}$$

$SF_6$  released from Pinole from 0600-1500 PDT.

$CBrF_3$  released from the Montezuma Hills from 0900-1100 PDT,  
and from 1300-1400 PDT.

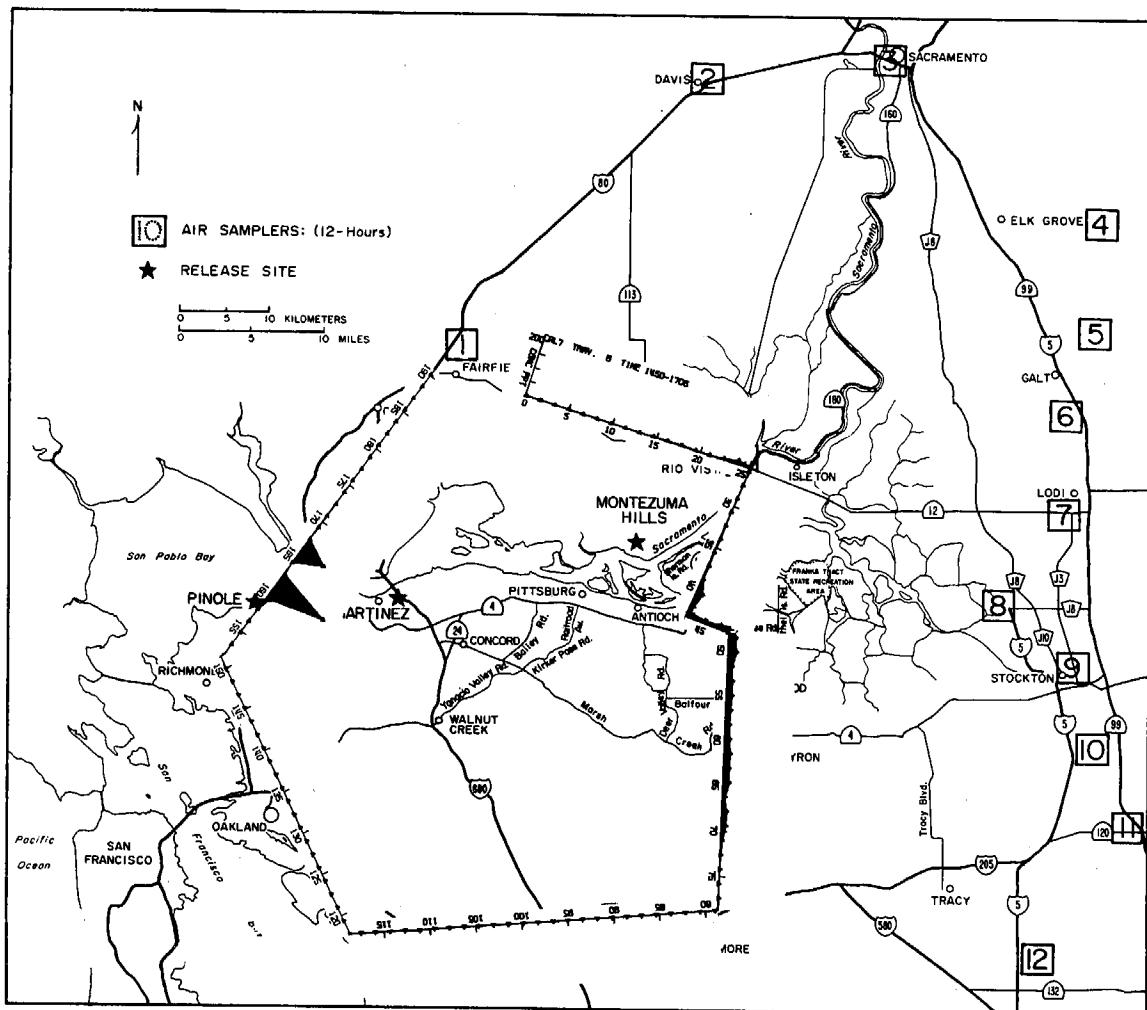


Figure 55.

TEST 7

9/13/76

## Auto Traverse:

8 1450 - 1706 PDT,  $SF_6$ (max) = 200 ppt $SF_6$  released from Pinole from 0600-1500 PDT. $CBrF_3$  released from the Montezuma Hills from 0900-1100 PDT,  
and from 1300-1400 PDT.

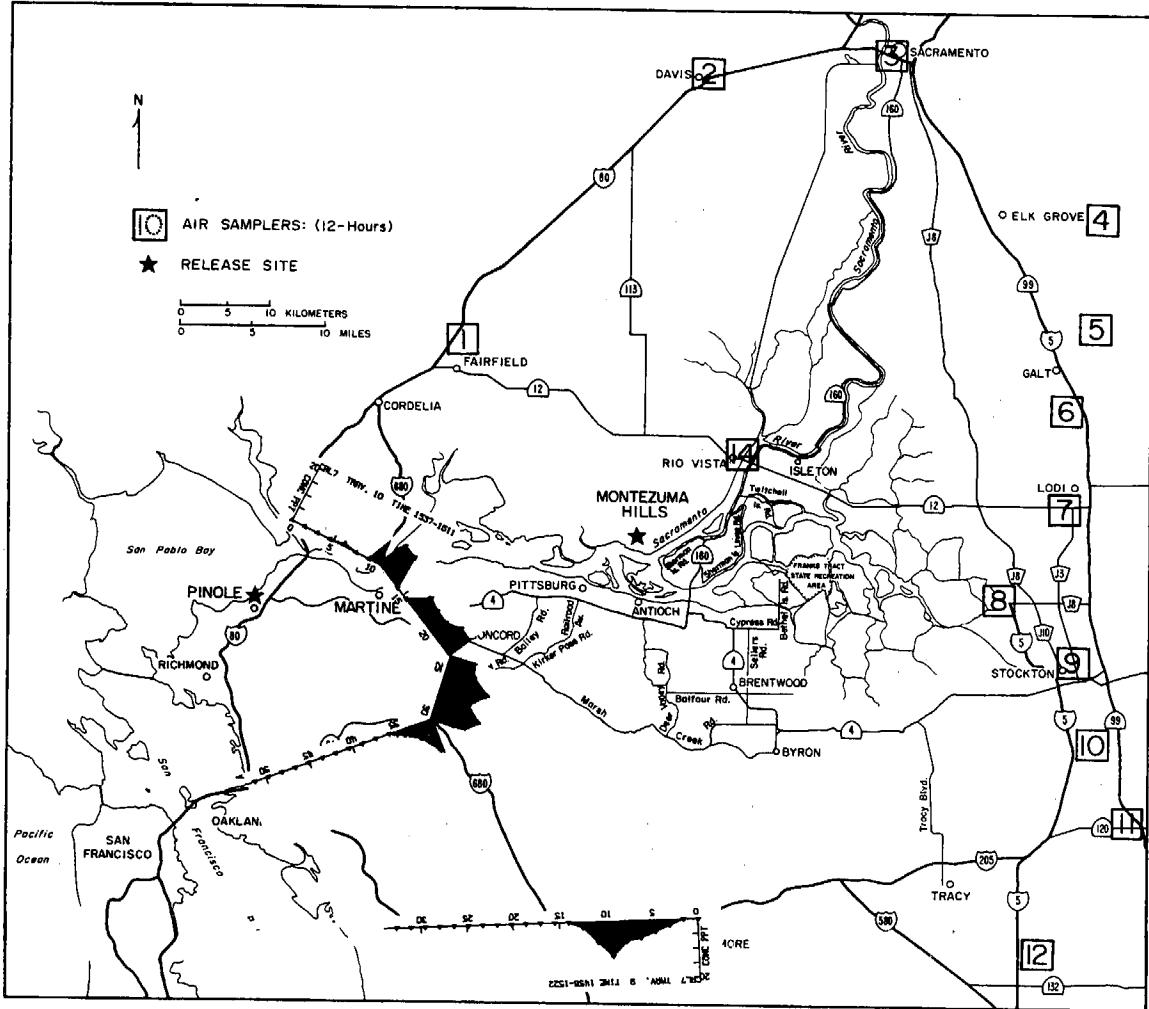


Figure 56.

## TEST 7

9/13/76

## Auto Traverses:

9 1458 - 1522 PDT, SF<sub>6</sub>(max) = 12 ppt.

10 1537 - 1611 PDT, SF<sub>6</sub> (max) = 16 ppt.

SF<sub>6</sub> released from Pinole from 0600-1500 PDT.

CBrF<sub>3</sub> released from the Montezuma Hills from 0900-1100 PDT  
and from 1300-1400 PDT.

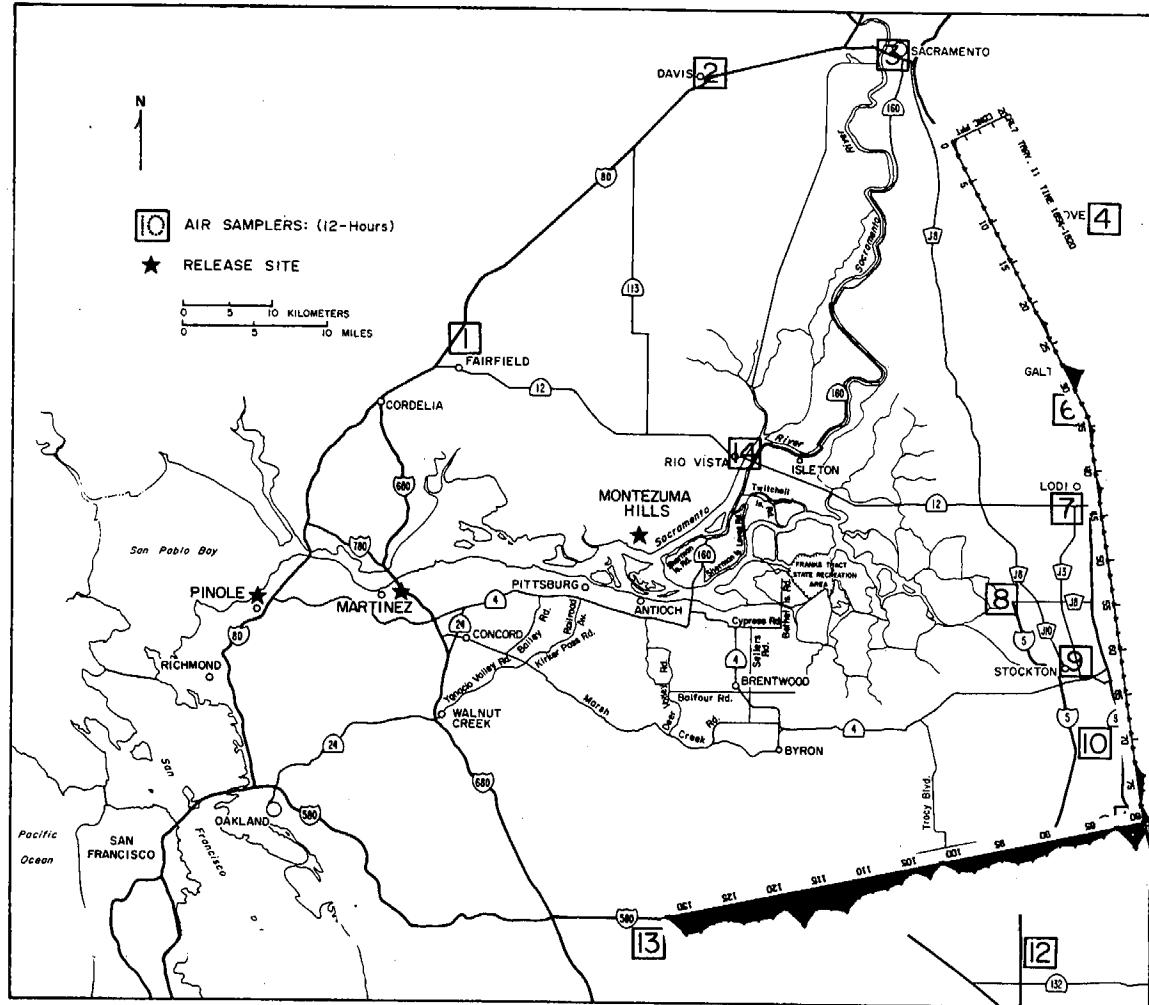


Figure 57.

TEST 7

9/13/76

## Auto Traverse:

11 1654 - 1820 PDT, SF<sub>6</sub>(max) = 12 ppt.

SF<sub>6</sub> released from Pinole from 0600-1500 PDT.

CBrF<sub>3</sub> released from the Montezuma Hills from 0900-1100 PDT  
and from 1300-1400 PDT.

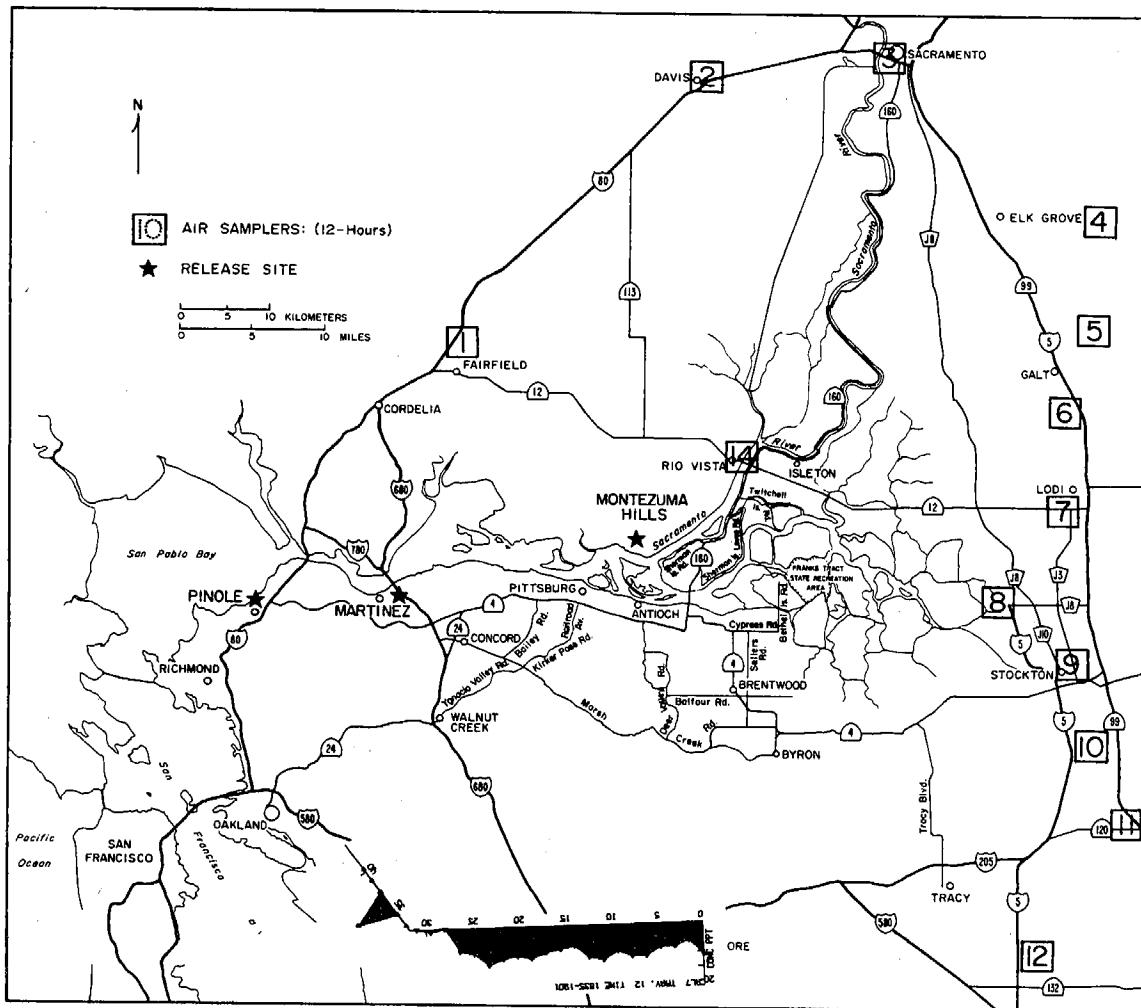


Figure 58.

TEST 7  
9/13/76

Auto Traverse:

12 1835 - 1901 PDT, SF<sub>6</sub>(max) = 13 ppt

SF<sub>6</sub> released from Pinole from 0600-1500 PDT.

CBrF<sub>3</sub> released from the Montezuma Hills from 0900-1100 PDT,  
and from 1300-1400 PDT.

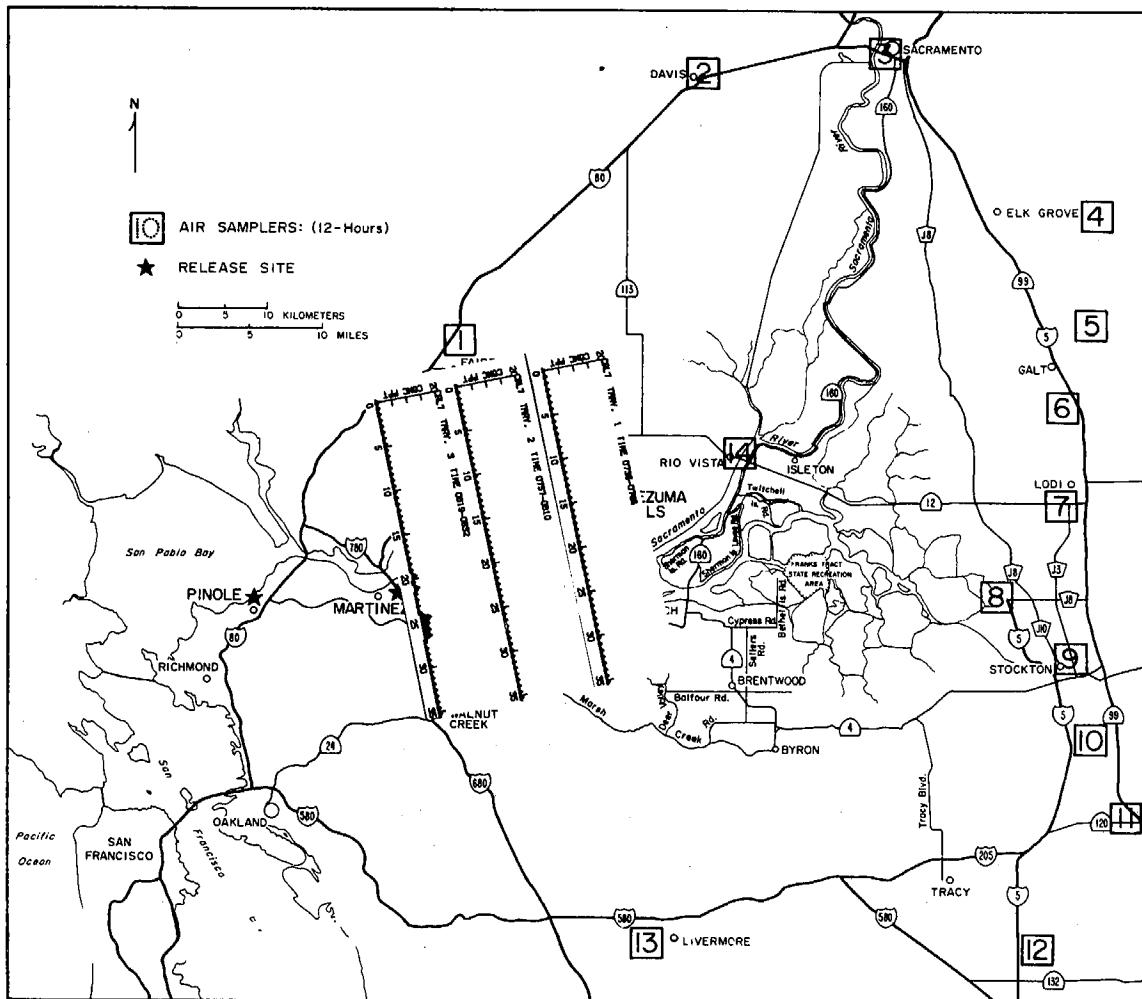


Figure 59.

## TEST 7

9/13/76

## Airborne Traverses:

- 1 0736 - 0748 PDT, 427 m, SF (max) = 0
- 2 0757 - 0810 PDT, 305 m, SF (max) = 0
- 3 0819 - 0832 PDT, 183 m, SF (max) = 3

$SF_6$  released from Pinole from 0600-1500 PDT.

$CBrF_3$  released from the Montezuma Hills from 0900-1100 PDT  
and from 1300-1400 PDT.

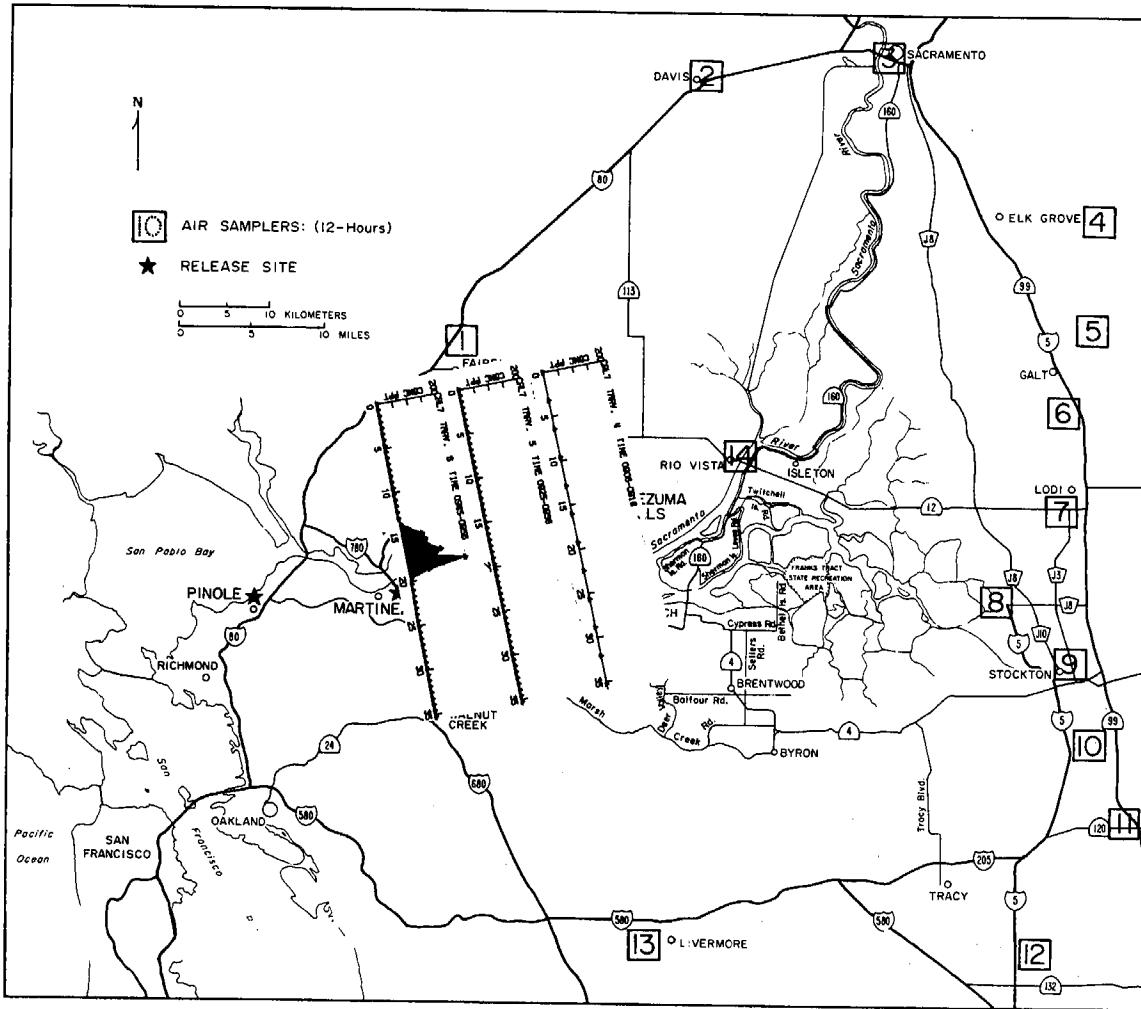


Figure 60.

## TEST 7

9/13/76

## Airborne Traverses:

- 4 0906 - 0918 PDT, 427 m, SF<sub>6</sub>(max) = 00 ppt
- 5 0925 - 0938 PDT, 305 m, SF<sub>6</sub>(max) = 1 ppt
- 6 0945 - 0958 PDT, 183 m, SF<sub>6</sub>(max) = 199 ppt

SF<sub>6</sub> released from Pinole from 0600-1500 PDT.

CBrF<sub>3</sub> released from the Montezuma Hills from 0900-1100 PDT  
and from 1300-1400 PDT.

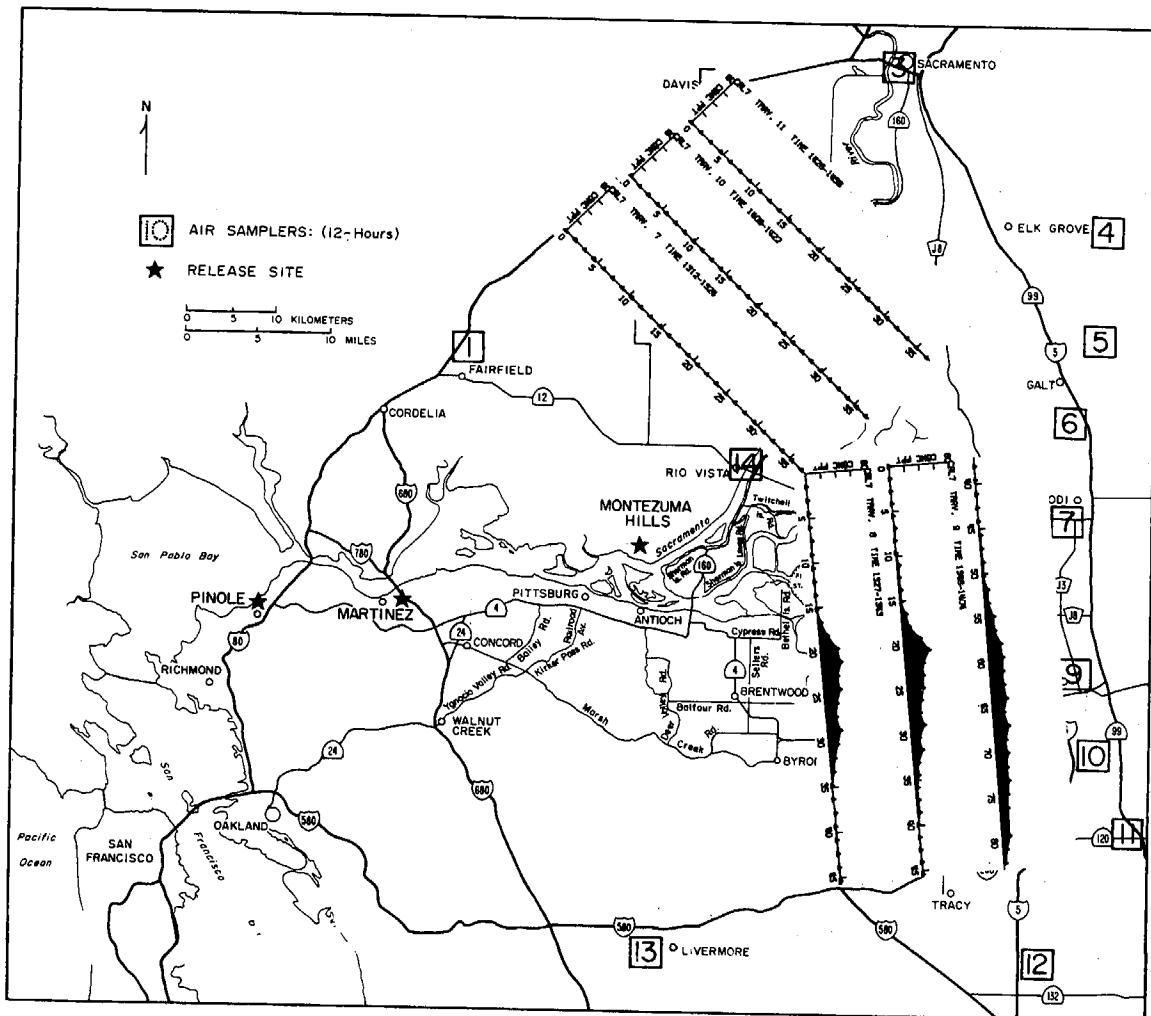


Figure 61.

TEST 7

9/13/76

## Airborne Traverses:

- 7 1312-1324 PDT, 183 m, SF<sub>6</sub> (max) = 0 ppt.
- 8 1327-1343 PDT, 183 m, SF<sub>6</sub> (max) = 19 ppt.
- 9 1348-1408 PDT, 305 m, SF<sub>6</sub> (max) = 25 ppt.
- 10 1409-1422 PDT, 305 m, SF<sub>6</sub> (max) = 1 ppt.
- 11 1428-1456 PDT, 427 m, SF<sub>6</sub> (max) = 15 ppt.

SF<sub>6</sub> released from Pinole from 0600-1500 PDT.

CBrF<sub>3</sub> released from the Montezuma Hills from 0900-1100 PDT and from 1300-1400 PDT.

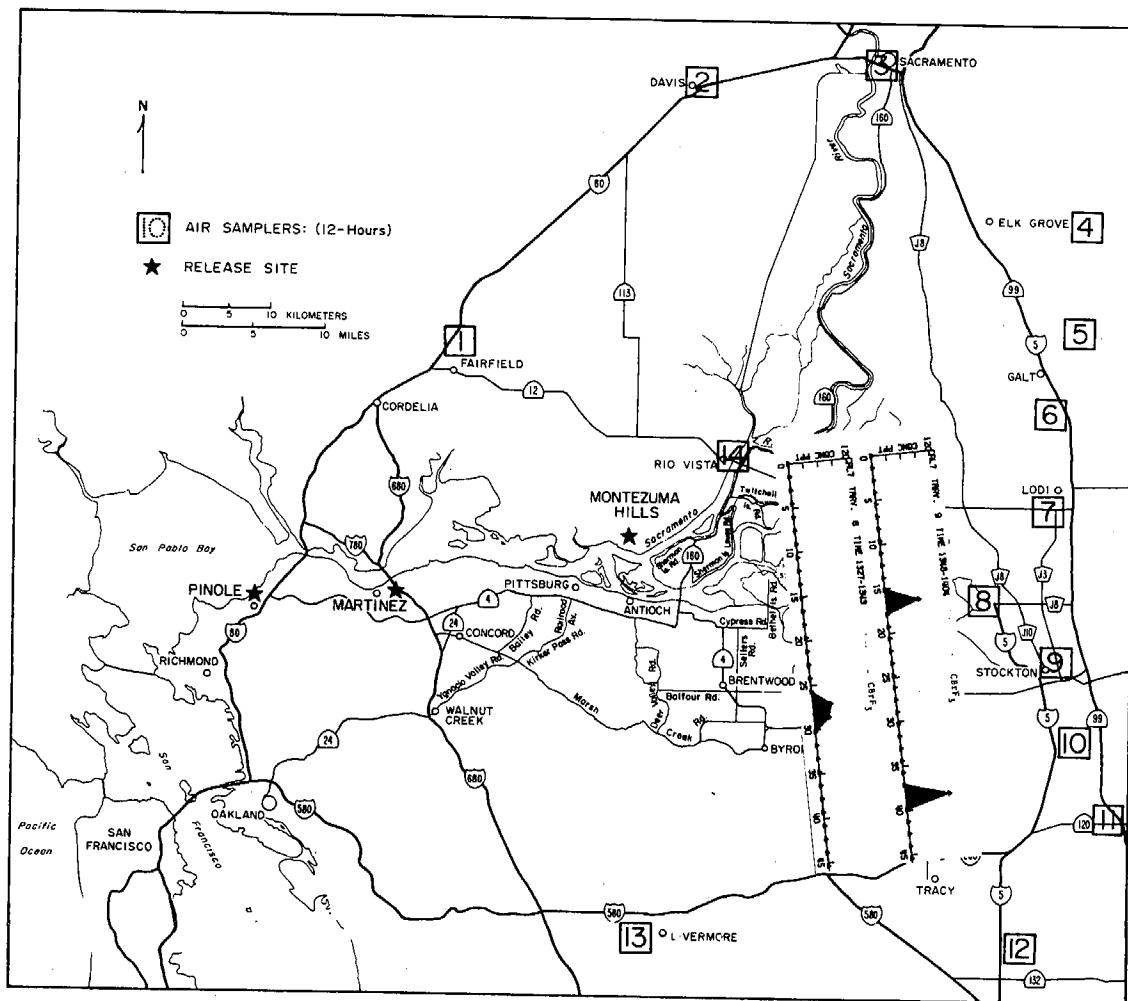


Figure 62.

TEST 7

9/13/76

## Air Traverses:

8 1327-1343, 183 m, CBrF<sub>3</sub>(max) = 19 ppt.

9 1348-1404, 305 m, CBrF<sub>3</sub>(max) = 25 ppt.

SF<sub>6</sub> released from Pinole from 0600-1500 PDT.

CBrF<sub>3</sub> released from the Montezuma Hills from 0900-1100 PDT  
and from 1300-1400 PDT.

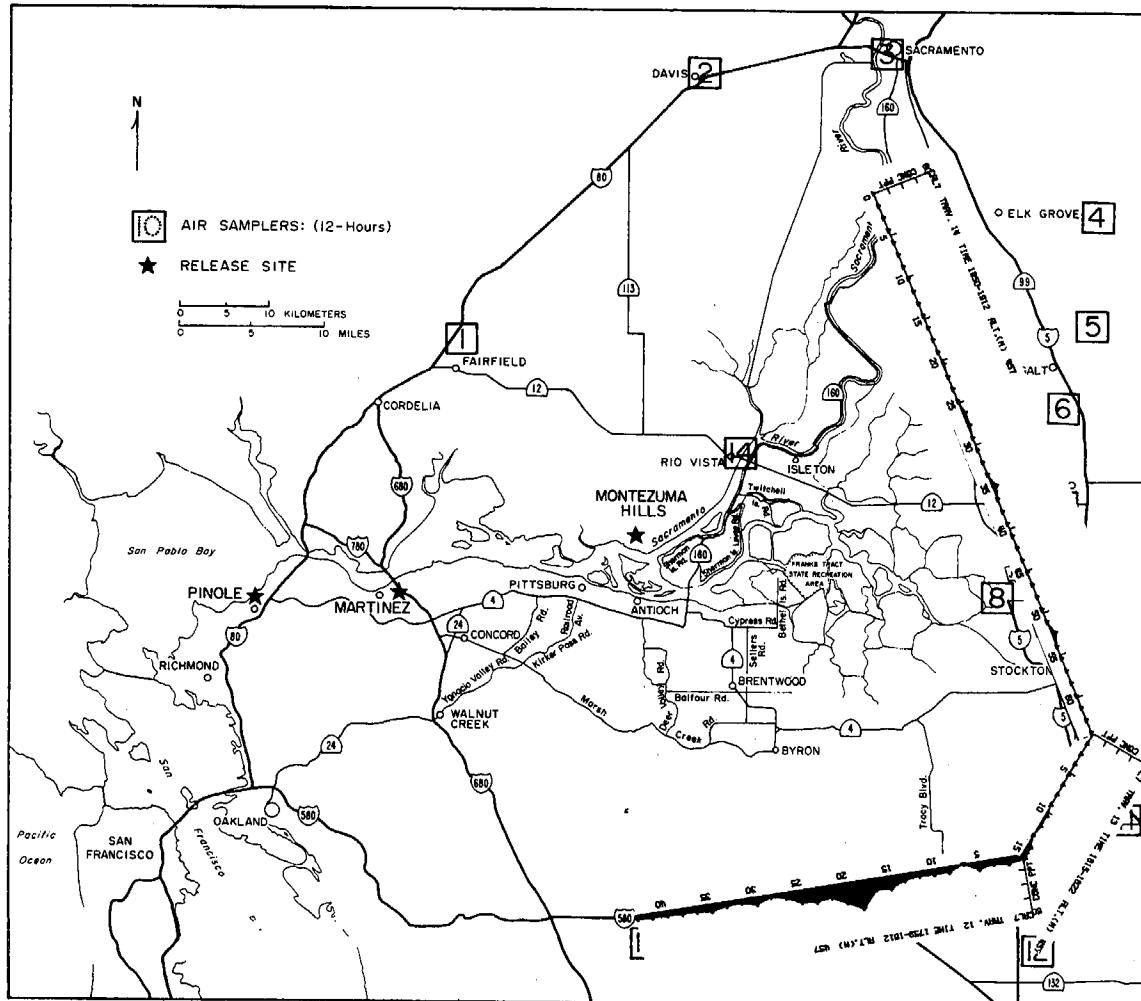


Figure 63.

## TEST 7

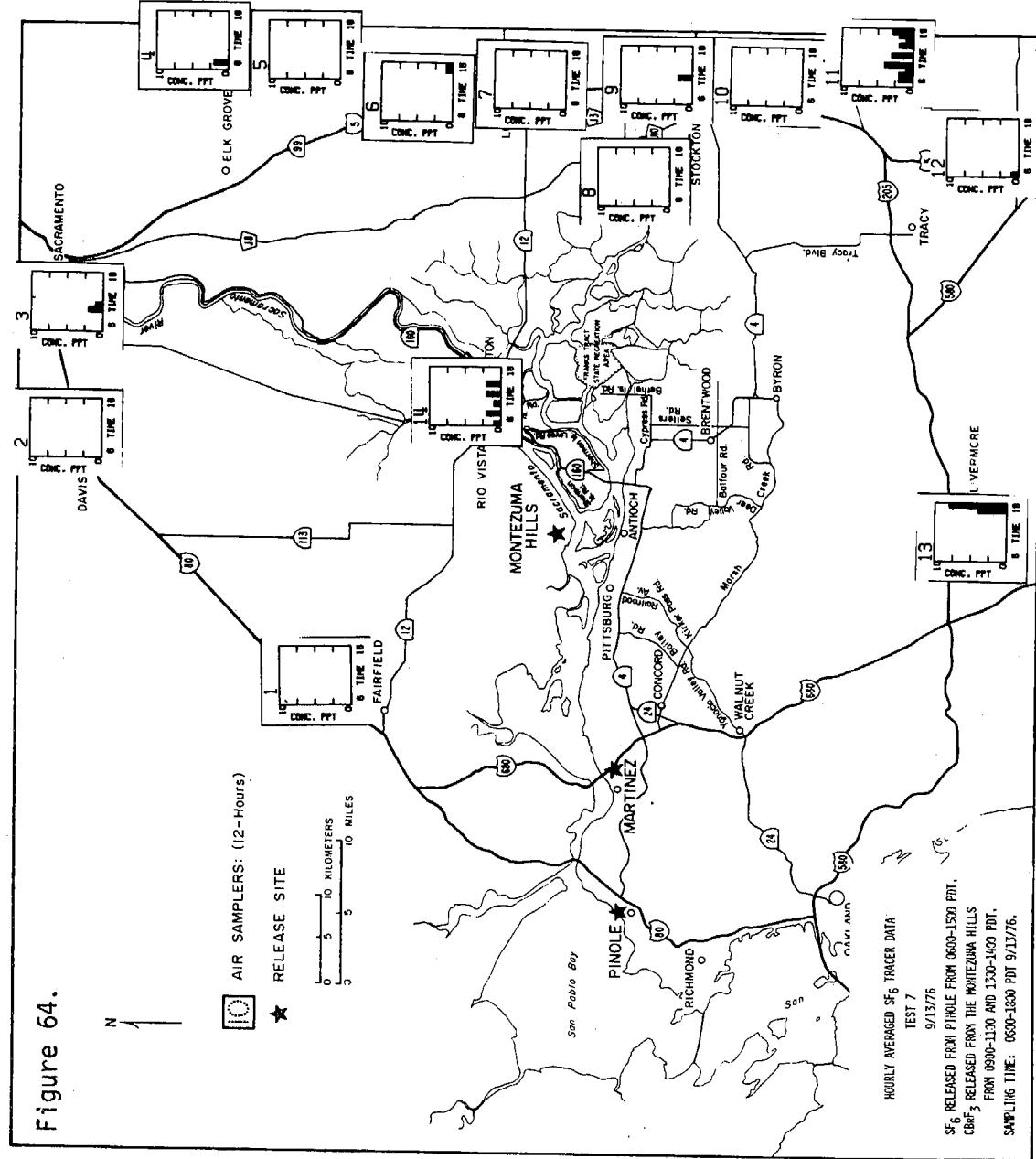
9/13/76

## Airborne Traverses:

- 12 1759 - 1812 PDT, 457 m, SF<sub>6</sub>(max) = 29 ppt  
 13 1815 - 1822 PDT, 457 m, SF<sub>6</sub>(max) = 5 ppt  
 14 1850 - 1912 PDT, 457 m, SF<sub>6</sub>(max) = 4 ppt

SF<sub>6</sub> released from Pinole from 0600-1500 PDT.

CBrF<sub>3</sub> released from the Montezuma Hills from 0900-1100 PDT and from 1300-1400 PDT.



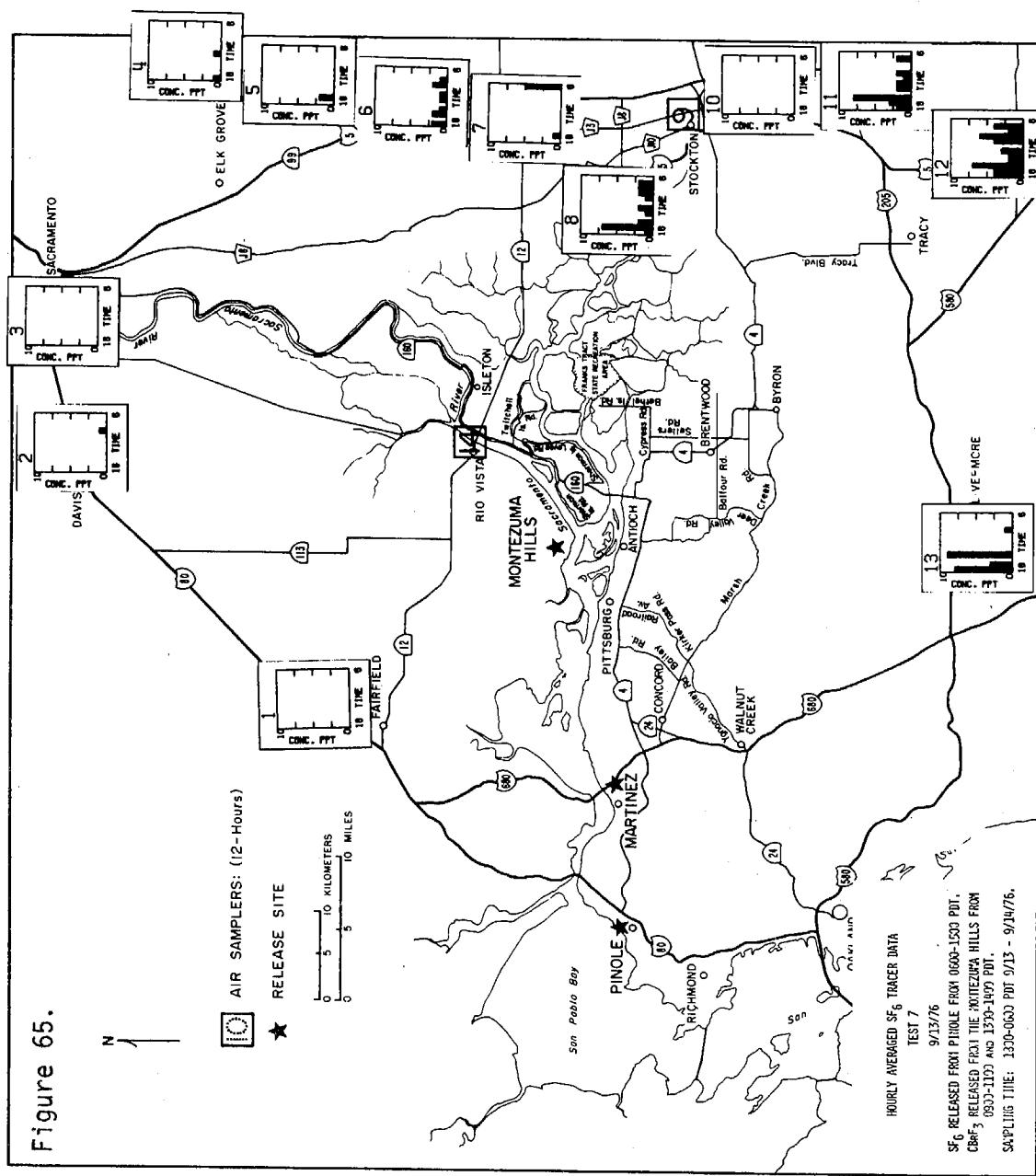


Figure 65.

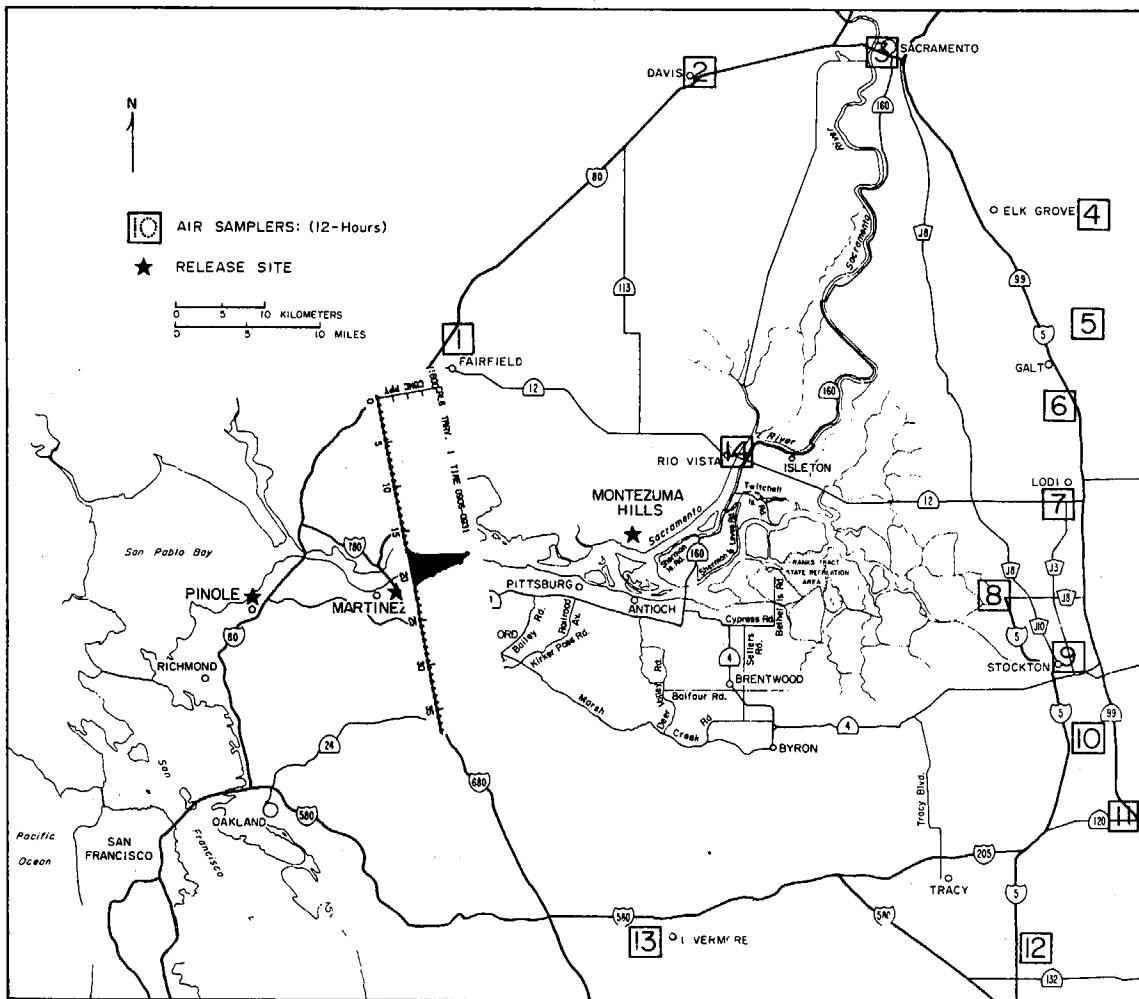


Figure 66.

## TEST 8

9/14/76

## Auto Traverse:

1 0906 - 0931 PDT, SF<sub>6</sub>(max) = 1598 ppt

SF<sub>6</sub> released from Pinole from 0730-1300 PDT.

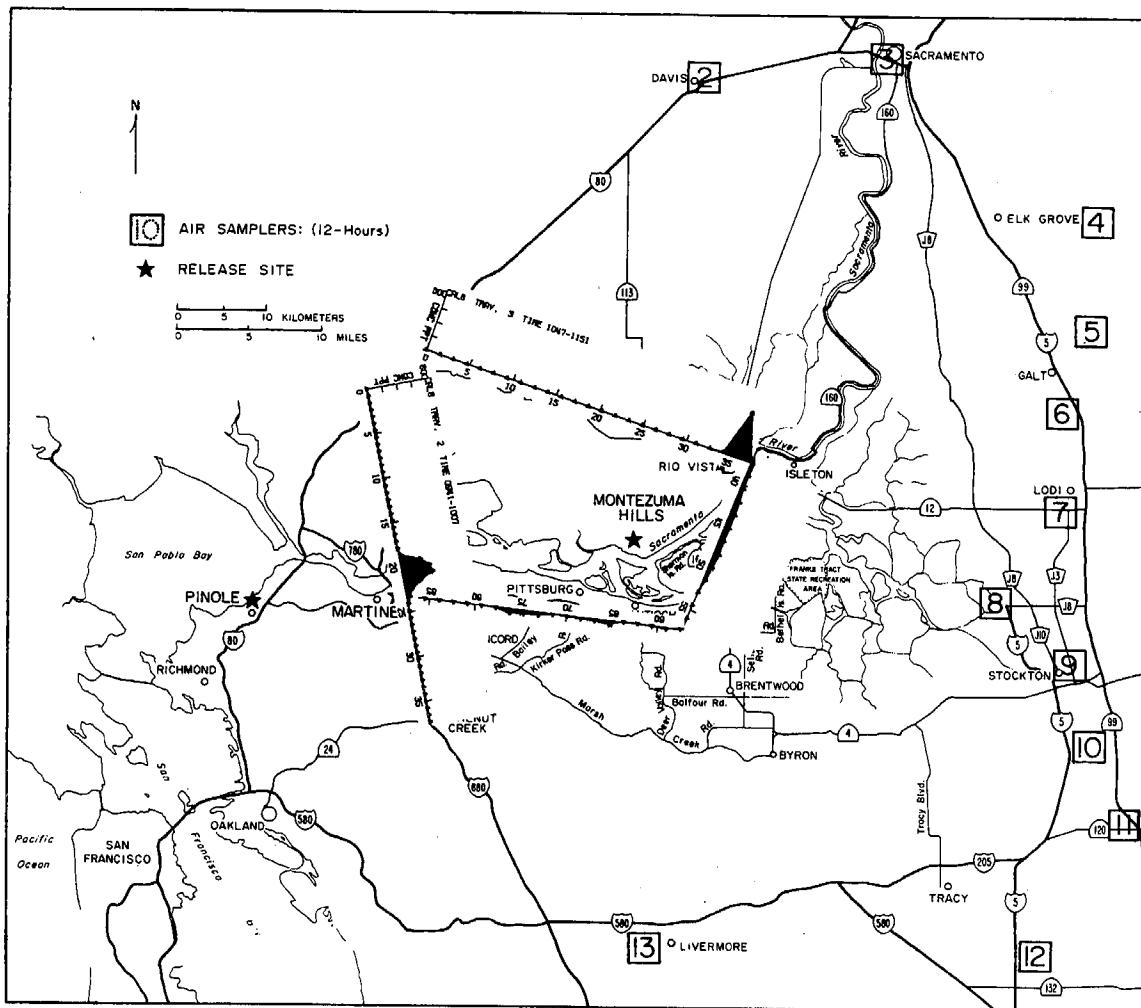


Figure 67.

## TEST 8

9/14/76

## Auto Traverses:

2 0941 - 1007 PDT, SF (max) = 412 ppt

3 1047 - 1151 PDT, SF (max) = 78 ppt

SF<sub>6</sub> released from Pinole from 0730-1300 PDT.

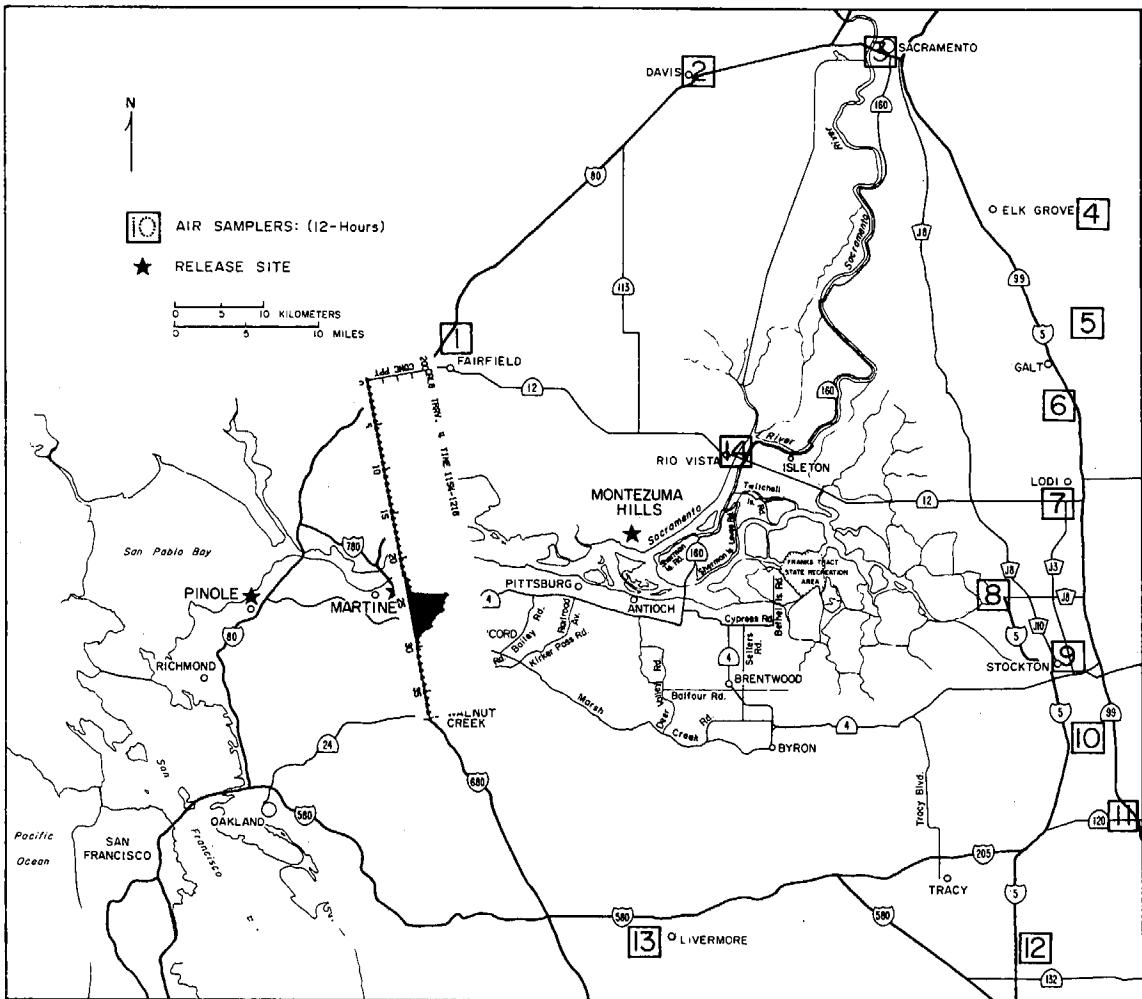


Figure 68.

TEST 8

9/14/76

Auto Traverse:

4 1154 - 1218 PDT, SF (max) = 129 ppt

 $SF_6$  released from Pinole from 0730-1300 PDT.

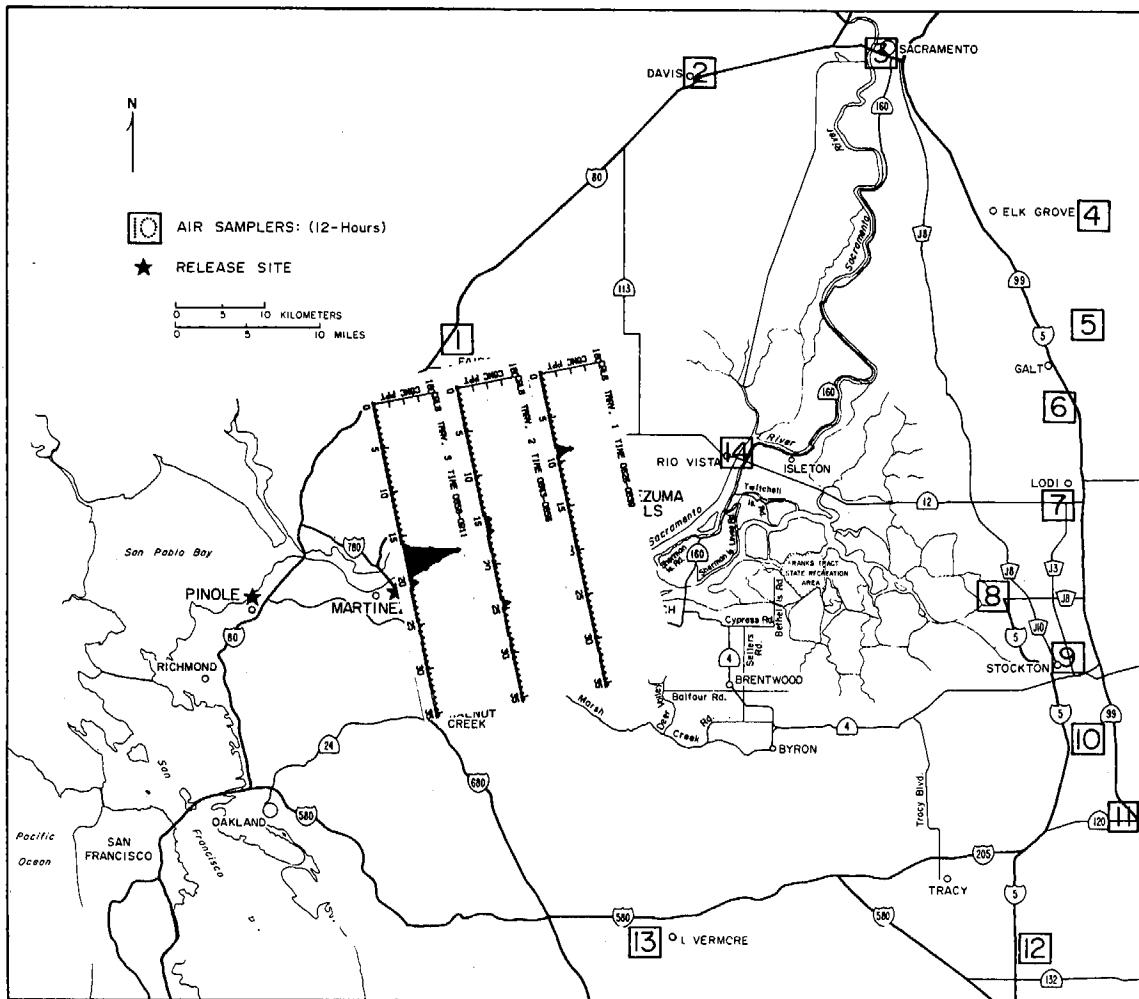


Figure 69.

## TEST 8

9/14/76

## Airborne Traverses:

- 1 0826 - 0839 PDT, 366 m, SF<sub>6</sub> (max) = 39 ppt
- 2 0843 - 0856 PDT, 274 m, SF<sub>6</sub> (max) = 15 ppt
- 3 0858 - 0911 PDT, 183 m, SF<sub>6</sub> (max) = 145 ppt

SF<sub>6</sub> released from Pinole from 0730-1300 PDT.

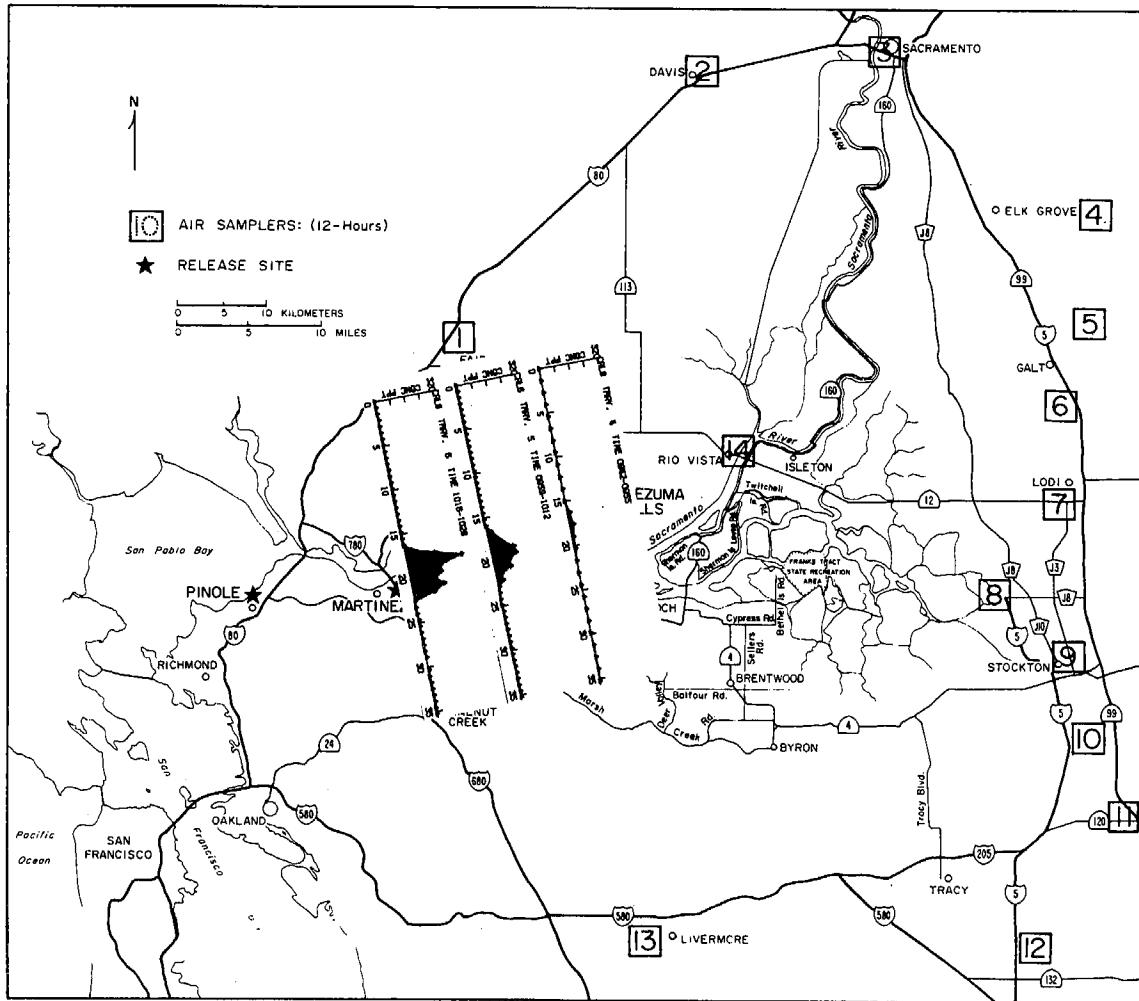


Figure 70.

TEST 8

9/14/76

## Airborne Traverses:

- 4 0942-0955 PDT, 427 m, SF<sub>6</sub> (max) = 22 ppt.
- 5 0959-1012 PDT, 305 m, SF<sub>6</sub> (max) = 134 ppt.
- 6 1016-1028 PDT, 183 m, SF<sub>6</sub> (max) = 304 ppt.

SF<sub>6</sub> released from Pinole from 0730-1300 PDT.